1960

Keys to Virginia Invertebrates

Virginia Institute of Marine Science

Algae

Classification of "Algae"

The following is a classification of the algae based upon the newer knowledge of physiology in which pigments, chemistry of food reserves and cell wall constituents are considered as indicative of phylogenetic relationships. All those organisms included in the Phylum Protozoa and which are also included in those phyla listed below cannot logically be associated in one phylum purely on the basis of their single-celled nature. Hence the Phylum Protozoa is a purely artificial group that does not indicate phylogenetic relationships (such as other phyla of the animal kingdom), except in its subdivisions, some of which deserve phylum rank in themselves.

Phylum I - CYANOPHYTA (MYXOPHYTA) Bluegreen algae

- No organized nucleus; simple cell division only (fission); no mitosis.
- Pigments in solution or as particulate matter in cell sap; no chromatophores.
- Chlorophyll a only; b-carotene, myxoxanthin, myxoxanthophyll, c-phycocyanin, and c-phycoerythrin.
- No flagellated cells; no sexual reproduction.
- Cyanophycean starch is stored.
- Cell walls form gelatinous sheath composed of agar-like, complex polysaccharide.
- Majority in freshwater, but numerous marine species.
- (All other phyla have an organized nucleus, mitotic cell division, and pigments localized in chromatophores.)

Phylum II - RHODOPHYTA Red algae

- No flagellated cells.
- Pigments: chlorophyll a (predominant), chlorophyll d, r-phycoerythrin (red), r-phycocyanin (blue), b-carotene, lutein (a xanthophyll).
- Stored food: Floridean starch (an isomer of starch of higher plants), and floridoside (a soluble carbohydrate composed of one molecule of galactose and one of glycerin).
- Cell walls composed of an agar-like, complex polysaccharide constituting a group of carbohydrates found only in the red algae and the bluegreens. Walls also composed in part of cellulose.
- Subclass Florideae exhibit complex life cycle involving a "tetrasporic" (2N) generation and separate male and female plants. The three types of plants are identical, except for their reproductive structures.
- Vast majority marine.
- Found to depth of 300 to 400 feet, or more, heavily calcified or "coralline" forms seem to grow to greatest depth.
- More abundant and conspicuous in warm waters.

Phylum III - PHAEOPHYTA Brown algae

Pigments: chlorophyll a (predominant), chlorophyll c, fucoxanthin (brown), other xanthophylls and b-carotene.

Food reserves: mannitol (a polyhydroxy alcohol), laminarin (dextrin-like polysaccharide found only in brown algae); both in solution. Starch not formed.

Cells walls: include a characteristic colloidal polysaccharide, algin, found only in the brown algae. Also cellulose.

Economic importance: as a source of algin or alginates.

Motile reproductive cells with two, unequal flagella.

Asexual reproduction by formation of zoospores or by fragmentation.

Sexual reproduction: isogamy, anisogamy, or oogamy.

Life histories may include two identical-appearing "generations" (Isogeneratae) as in the red algae; morphologically different generations (Heterogeneratae); or only the 2N generation (Cyclosporeae)

More numerous and conspicuous in temperate and cold waters than in tropics; rockweeds (intertidal) and kelps abundant in north (N. J. northward); Sargassum characteristic of warm waters.

Phylum IV - CHLOROPHYTA Green algae

Pigments same as in the land plants; chlorophylls a and b, b-carotene, lutein and other xanthophylls.

Stored food: starch.

Reproductive cells usually with two or four flagella; those with four are usually 2N cells (zoospores).

Cell walls of cellulose and pectin.

Majority (about 90 per cent) in freshwater; virtually all the large and morphologically complex species are marine, however.

Grow to depth of 300 to 400 feet, at least, in clear, tropical seas (as around Tortugas).

Majority with one nucleus per cell; many, however, are multinucleate or coenocytic (acellular?).

Life histories somewhat similar to reds and browns: there may be alternation of like generations, or all plants may be either N or 2N, with the opposite situation represented only by gametes (N) or the zygote (2N).

Phylum V - EUGLENOPHYTA

Pigments same as in the Chlorophyta (or lacking in a few spp.); xanthophylls not yet thoroughly studied.

Food reserves: paramylum (an insoluble carbohydrate related to starch), and fats.

Cell walls: gelatinous lorica in some; no cellulose.

Reproduction usually by cell division; sexual reproduction very rare.

Majority are naked, unicellular flagellates, though in one genus (Colacium) there is a non-motile, colonial form of growth.

Differ from the Chlorophyta in organization of the protoplast; they are a sharply defined group and should no longer be considered a class of the Chlorophyta.

Ctenophora - Scyphozoa

Key to the Free-swimming Animals of Jelly (less Hydromedusa) of Chesapeake Bay

by Harold Cones, Jr.

1. Symmetry biradial; sensory area aboral; 8 meridional rows of fused cilia . . . . . .Phylum Ctenophora
   Tentacles and/or mouth lobes present, or tentacles lacking; bell margin scalloped. . . . . Phylum Coelenterata, Class Scyphozoa

Phylum Ctenophora

1. Tentacles lacking; mouth and stomach very wide; body conical, often rose colored. . . . . .*Beroe ovata*
   Pair of tentacles present . . . . . (2)

2. Tentacles long, with numerous side branches, on opposite sides of body; ribs 8, equal. . . . . *Pleurobrachia pileus*
   Tentacles inconspicuous; auricles long and large; combs prolonged onto lobes almost to their oral ends. . . . . .*Mnemiopsis leidyi*

Class Scyphozoa

1. Marginal tentacles lacking. . . . . *Rhopilema verrilli*
   Marginal tentacles present. . . . . (2)

2. Bell flat, translucent, white or bluish with 4 horseshoe-shaped, pink gonads; oral lobes long and narrow; marginal tentacles short and numerous . . . . . *Aurelia aurita*
   Bell deep, usually possessing color; marginal tentacles long. . . . . (3)

3. Oral lobes long; 8 groups of very long tentacles extending from the subumbrella; gonads in 4 clusters, located between tentacles and oral lobes. . . . . *Cyanea capillata*
   Marginal tentacles individual, up to 40 in number; marginal lappets about 48, red pigmented areas present or lacking . . . . . .*Chrysaora quinquecirrha*

Hydroids

Key to Some Virginia Hydroids

Dale Calder

1. Hydranth unprotected by hydrotheca . . . . . .Gymnoblastea (2)
   Hydranth protected by hydrotheca . . . . . .Calyptoblastea (18)

2. Hydranth with scattered capitate tentacles only. . . . . (3)
   Hydranth with filiform tentacles . . . . . (4)

3. Stem unbranched or only slightly branched, medusa with two well developed and two rudimentary tentacles at liberation . . . . . *Corynitis agassizii*
   Stem much branched, medusa with four well developed tentacles at liberation. . . . . .*Syncoryne eximia*

4. Hydranth with filiform and capitate tentacles, latter in regular whorls. . . . . *Pennaria tiarella*
   Hydranth with filiform tentacles only. . . . . (5)

5. Hydranth with tentacles scattered. . . . . .Clavidae (6)
   Hydranth with tentacles in distinct whorls . . . . . (8)

6. Colony regularly branched, annulations present, in fresh or brackish water . . . .*Cordylophora lacustris*
   Colony slightly branched or unbranched, no annulations. . . . . (7)

7. Perisarc thick, proboscis elongated, tentacles in a series of irregular whorls . *Turritopsis nutricola*
   Perisarc thin, proboscis not elongated, tentacles not in whorls . . . . . .*Clava leptostyla*

8. Hydranth with one whorl of tentacles . . . . . (9)
   Hydranth with two whorls of tentacles, proximal whorl longer than distal . . . . . Tubularidae (17)

9. Colonies with no perisarc covering zooids, zooids arising singly from mat of stolons . . . . . Hydractinidae (10)
   Zooids protected by perisarc . . . . . (13)

10. Tentacles absent on reproductive zooids, numerous on nutritive zooids, free medusae not produced. . . . . .*Hydractinia echinata*
    Tentacles present on reproductive zooids, free medusae produced . . . . . (11)

11. Crust of coenosarc covering stoloniferous network . . . . . *Podocoryne carnea*
    Stoloniferous network not covered by a coenosarc, medusae somewhat degenerate. . . . . *Stylactis* (12)

Tentacles forming double row on hydranth, stolon-like processes and a constriction may occur at distal end of a zooid. . . . . .*Stylactis arge*
Single row of tentacles, constrictions or lateral buds not present. . . . . *Stylactis hooperi*

Hydranths with a trumpet-shaped proboscis, perisarc ending below the hydranth. . . . . .*Eudendrium* (14)
Hydranths with a conical proboscis, perisarc often extending to base of tentacles . . . .Atractylidae (15)

14. Well marked annulations present, stem fascicled, colony large and much branched. . . . . .*Eudendrium carneum*
Annulations indistinct or absent, colony minute, without branches or sparsely branched. . . . . .*Eudendrium album*

15. Stem fascicled, medusae produced . . . . . (16)
Stem simple, planulae produced, female gonophores, ova, and young planulae bright blue . . . . . *Calyptospadix cerulea*

16. Proboscis large and flexible, gonophores scattered over stem, branches, and pedicels, singly or in clusters, medusa with 7-9 tentacles in each cluster. . .*Bougainvillia carolinensis*
Proboscis of medium size, gonophores on hydranth pedicles just below hydranth, medusa with three tentacles in each cluster . . . . . .*Bougainvillia rugosa*

17. Stem of hydroid reaching about 1.5 cm, about 30 proximal and 24 distal tentacles, free medusae produced. . . . . *Ectopleura dumortieri*
Stem of hydroid greater than 1.5 cm, colony growing in immense tufts, perisarc not annulated, actinulae produced rather than medusae. . . . . .*Tubularia crocea*

18. Hydrothecae free from stem, supported on a pedicel. . . . . (19)
Hydrothecae adnate on stem . . . . . (29)

19. Hydrotheca saucer-shaped, not covering hydranth, stem and branches fascicled, nodes oblique, hydrophore lateral on female gonagium . . . . . .*Halecium beani*
Hydrotheca capable of covering hydranth. . . . . (20)

20. Hydrotheca campanulate, operculum absent . . . . . .Campanularidae (21)
Hydrotheca turbinate, operculum present. . . .Campanulinidae (28)

Teeth on hydrothecal margin castellate, sporosacs extruded into sac at top of gonangium, colony 3 cm or more in height. .*Gonothyraea loveni*
Teeth on hydrothecal margin not castellate . . . . . (22)

Colony unbranched or irregularly branched, springing from a creeping rootstalk, free medusa produced with 4 marginal tentacles at liberation, marginal teeth acute, rarely more than 14 in number. . . . . .*Clytia* (23)
Colony regularly branched, irregularly branched, or unbranched, medusa with 8 or more marginal tentacles at liberation, teeth, if present, bicuspid . . . . . (24)

23. Teeth 7 to 12, usually 8 or 9, very deeply cut; colony unbranched or with a few irregular branches, pedicel annulated proximally, distally, and frequently in middle . . . . . *Clytia coronata*
Teeth 10 to 12, sharp pointed and deeply cut, stem unbranched, annulations proximal and distal, hydrotheca cylindrical. . . . . *Clytia cylindrica*

24. Stem regularly branched or unbranched, free medusa produced. . . . . .*Obelia* (25)
Stem regularly or irregularly branched, or branches lacking, planulae produced instead of medusae. . . . . .*Campanularia* (27)

25. Hydrotheca with about 10 bicuspid teeth, colony often with a fascicled stem. . .*Obelia bicuspidata*
Hydrothecal margin entire, stem not fascicled . . . . . (26)

26. Colony small (2.5 cm high), stem geniculate, pedicels given off from a shoulder-like process of the internode, pedicel very short, stem unbranched. . . . . *Obelia geniculata*
Colony large (reaching 20 cm), shoulder-like processes absent on internodes, pedicels frequently as long or longer than hydrothecae, branches present. . . . . .*Obelia commissuralis*

27. Stem fascicled, 10 teeth each with V-shaped indentations, grows in clusters 20-25 cm high. . . . . *Campanularia gelatinosa*
Stem simple, hydrothecal margin entire, depth and breadth of hydrotheca about equal, colony small, 3 cm or less, stem flexuous, with annulations throughout on the pedicel. . . . . *Campanularia flexuosa*

Opercular segments with a hinge-like base, gonangia elongated, tapering gradually from the distal end, distal end truncate. . . . . .*Lovenella gracilis*

Opercular segments lacking a hinge-like base, gonangia fusiform . . . . . .*Opercularella pumila*

29. Hydrothecae adnate on both sides of stem and branches, nematophores absent, hydrothecal margin with 2 or 3 teeth. . . . . .Sertularidae (30)

Hydrothecae adnate on one side of stem or branches, nematophores absent . . . . . .Plumularidae (33)

30. Hydrothecae in opposite pairs, with one pair to each internode. . . . . .*Sertularia* (31)

Hydrothecae alternate, several hydrothecae to each internode, if such are present. . . . .*Thuiaria* (32)

31. Hydrothecae large, with perisarcal projections extending from base (specimens must be clean to see this), hydrothecal pairs contiguous for half their length in front, well apart but parallel in back. Reaches 5 cm in its robust form, usually unbranched, though an occasional branch may be found, gonosome oval, rugose . . . . . .*Sertularia cornicina*

Stem not definitely divided into internodes, hydrothecae tubular and not strongly turned outward, largely immersed, hydrothecae usually close, gonangia short and stout, with two prominent shoulder spines . . . . . *Thuiaria cupressina*

32. One nematophore per internode, colony reaching 1.2 cm, hydrocladia divided into thecate and non-thecate internodes . . . *Plumularia diaphana*

One or two nematophores per internode, colony reaching 5 cm, hydrocladia divided into (1) short internode without a nematophore, node transverse at both ends, (2) longer internode, node transverse proximally and oblique distally, (3) thecate internode, node oblique proximally and transverse distally. . . . . .*Schizotricha tenella*

Sea Anemones

Key to Sea Anemones of Chesapeake Bay

by Marvin L. Wass*

1. Pedal disc present. . . . . (2)
   Pedal disc lacking, basal and rounded . . . . . (5)

2. Acontia lacking, burrowing "sea onion". . . .*Paranthus rapiformis*
   Acontia present, animal attached to solid substrate. . . . . (3)

3. Color dark olive-green, often with bright orange or lighter stripes; may be flecked with yellow or be uniformly dark. Most abundant in intertidal . . . Haliplanella, *Aiptasiomorpha luciae*
   Color lighter . . . . . (4)

4. Column white, base large; tentacles brown and yellow, tentacular base with a pair of dark brown spots, from each of which extends a light-brown line. In deeper water of bay. Possibly a burrower . . . . . Unid. species
   Column pale pink or flesh-colored, with upper portion and tentacles tending to be greenish from a symbiotic alga. Euryhaline, abundant, usually subtidal . . . . . *Diadumene leucolena*

5. Column rough. . . . . (6)
   Column smooth. . . . . (7)

6. Tentacles numbering 16; column rust orange to tan, slender, longitudinally grooved . . . . .*Edwardsia elegans?*
   Tentacles 20; column with epidermis conspicuously reticulated. . . . . .*Edwardsia sipunculoides?*

7. Usually large, living in mucoid tube in clay-silt substrate above 20 ‰ salinity. Tentacles purple to brown. . . . . *Ceriantheopsis americanus*
   Individuals small, slender; found in oligohaline areas. Our most delicate and transparent anemone. . . . . .*Nematostella vectensis*

*This key is enlarged from one begun by Donna Hindelang, who is responsible for the addition of *Edwardsia sipunculoides* and the unid. species. *Edwardsia elegans* has not been determined by an authority. Dr. Charles Cutress of the University of Mayaguez identified all the other species.

Nemerteans

A Key to the Species of Nemerteans of Virginia

by William McCaul

1962

(This key does not constitute final publication.)

1.		Living commensally in mollusks or crabs	(2)
		Free-living	(3)
2.	(1)	Commensal in mantle-cavity of mollusks. . *Malacobdella grossa*	
		Commensal in gills or in egg-masses of crabs . . . . . .*Carcinonemertes carcinophila*	
3.	(1)	Ocelli present.	(4)
		Ocelli absent	(13)
4.	(3)	Cephalic grooves present. . . . . .*Lineus bicolor*	
		Cephalic grooves absent	(5)
5.	(4)	Two ocelli. . . . . *Amphiporus bioculatus*	
		More than two ocelli.	(6)
6.	(5)	Four ocelli	(7)
		More than four ocelli	(11)
7.	(6)	Striped, mottled, or banded	(8)
		Color uniform, or nearly so	(10)
8.	(7)	With two brown longitudinal stripes . . . *Tetrastemma elegans*	
		Irregularly patterned; no stripes	(9)
9.	(8)	Body encircled with irregular bands . . . .*Oerstedia dorsalis*	
		Irregularly mottled; eyes on the same side connected by a band of pigment. .*Tetrastemma vermiculus*	
10.	(7)	Color whitish or greenish . . . . . .*Tetrastemma candidum*	
		Color uniform dark brown. . . . . *Tetrastemma jeani*	
11.	(6)	Color greenish; basis of central stylet massive, truncate at posterior end. . . . . .*Zygonemertes virescens*	
		Color variable; basis not as above.	(12)
12.	(11)	Color ochre; basis of central stylet pear-shaped. . . . . .*Amphiporus ochraceus*	
		Numerous tiny red spots; basis of central stylet deeply constricted in middle. . . . . *Amphiporus rubropunctus*	

	(3)	Proboscis armed	. . . *Amphiporus caecus*
		Proboscis unarmed	. . . . . (14)
14.	(13)	Cephalic grooves absent	(15)
		Cephalic grooves present.	(18)
15.	(14)	Body rounded in cross-section, head broad; lateral ridges indicating location of lateral nerve-cords. . . .	. *Tubulanus pellucidus*
		Body flattened, rounded in preserved material	(16)
16.	(15)	Pale white; broad, darker band encircling body in esophageal region. A pair of white, lateral sense organs. .	. *Carinomella lactea*
		White, light brown, or red in color; may be a reddish tinge in esophageal or intestinal region	(17)
17.	(16)	Head broader than rest of body and rounded anteriorly	. *Carinoma tremaphoros*
		Head sharply pointed and narrow .	. *Zygeupolia rubens*
18.	(14)	Head rounded anteriorly	. . . . . (19)
		Head spatulate or pointed	. . . . . (20)
19.	(18)	Body large; color white; mouth large.	. *Cerebratulus lacteus*
		Body not so large; color red; mouth small.	. *Micrura ruber*
20.	(18)	Color white	. *Lineus pallidus*
		Color red	. . . . . (21)
21.	(20)	Cephalic grooves long, deep, flaring.	. *Cerebratulus luridus*
		Body rounded, not adapted for swimming	. *Micrura leidyi*

Polychaetes

Key to the Polychaetes of Virginia
(Adapted from works of Marian Pettibone, Olga Hartman, and Pierre Fauvel)

Marvin Wass, James Melvin, and James Kerwin

Species marked by an asterisk are from the ocean.

Key to Families (Polychaeta Errantia)

1. Elytra present (Superfamily Aphroditoidea). . . . . (2)
   Elytra lacking. . . . . (4)

2. Dorsal "feltage" largely obscuring elytra.
   Aphroditidae . . . . . *Aphrodita hastata
   Elytra clearly visible. . . . . (3)

3. (2) Dorsal cirri lacking. Elytra on all posterior segments . . . . . Sigalionidae
   Dorsal cirri present on segments lacking elytra. Elytra absent from some posterior segments . . . . . Polynoidae

4. (2) Dorsal cirri posterior to lateral fan-like tufts of notosetae. . . . . (5)
   Dorsal cirri lacking or otherwise . . . . . (6)

5. (4) Large notosetae in golden fan-shaped groups curving over dorsum. Branchiae lacking. Chrysopetalidae. . . . . Paleanotus heteroseta
   Notoseta pointed laterally. Branched branchiae posterior to notopodial bases on certain anterior segments. Amphinomidae . . . . . Pseudeurythoe paucibranchiata

6. (4) Dorsal and ventral cirri, if present, not leaf-like or globular. . . . . (7)
   Dorsal and ventral cirri flattened, leaf-like or variably globular . . . . . Phyllodocidae

7. (6) Prostomium conical, annulated, ending distally in 4 minute antennae (Superfamily Glycerea) . . . . . (8)
   Prostomium not as above . . . . . (9)

8. (7) Parapodia similar, either all uniramous or all biramous; dorsal cirri small, globular; ventral cirri larger, conical; proboscis with 4 subequal jaws (macrognaths) . . . . . Glyceridae
   Parapodia dissimilar: (1) anterior region with uniramous parapodia; (2) posterior region with biramous parapodia; dorsal and ventral cirri conical to ligulate; proboscis with pair of dentate macrognaths and variable number of micrognaths . . . . . Goniadidae

9. (7) Body subrectangular in cross-section. Biramous parapodia with rami well separated and with long cilia along interramal border; notosetae and neurosetae arranged in fan-shaped bundles; prostomium flattened, shield-shaped, subconical to sub-rectangular, with 4 small antennae . . . . . .Nephtyidae
Body, parapodia, and prostomium otherwise. . . . . (10)

10. (9) Jaw apparatus elaborate, dark, chitinous; tentacular cirri absent (or with only a single short dorsolateral pair) (Superfamily Eunicae). . . . . (11)
Jaws absent or otherwise; with 1-8 pairs of lateral tentacular cirri. . . . . (16)

11. (10) Prostomium simple, conical, or suboval, without antennae or distinct palps; parapodia lacking cirri; body smooth, elongate, cylindrical, resembling slender earthworm. . . . . (12)
Prostomium suboval with 1-7 antennae; parapodia with dorsal cirri; body not like an earthworm. . . . . (13)

12. (11) Neurosetae consisting of limbate setae with fine tips and hooded hooks or crotchets. . . . . Lumbrineridae
Neurosetae consisting of limbate setae, with or without projecting acicular setae; without hooded hooks or crotchets . . . . Arabellidae

13. (11) Antennae 3. Dorsal cirri foliaceous, ventral cirri absent. Lysaretidae . .*Lysarete brasiliensis
Antennae 1-7. Dorsal cirri not foliaceous, ventral cirri present. . . . . (14)

14. (13) First 2 segments apodous and achaetous; prostomium with 5 antennae or less . . . . . (15)
First apparent segment apodous and achaetous; prostomium with 7 antennae (5 long occipital, 2 short frontal). . . . . Onuphidae

15. (15) Prostomium with a pair of articulated antennae and a pair of long curved ventral palps. . . . . .Dorvilleidae
Prostomium with 1-5 occipital antennae and a pair of short globular ventral palps. . . . . Eunicidae

16. (10) Neurosetae compound (blades may be secondarily fused to shafts in some Syllidae). . . . . (17)
Neurosetae simple . . . . . Pilargiidae

17. (15) Parapodia biramous or subbiramous . . . . . (18)
Parapodia uniramous . . . . . .Syllidae

18. (15) Parapodia with varying degrees of development of extra tongue-like lobes or ligules; prostomium suboval to subpyriform, with 2 frontal antennae and 2 biarticulate palps; proboscis with a pair of distal, dentate, hooked jaws; notosetae compound . . . . . .Nereidae
Parapodia without ligules; prostomium suboval to subquadrangular, with 2-3 antennae and 2 palps (palps sometimes biarticulate); proboscis without jaws or otherwise; notosetae simple or lacking. . . . . .Hesionidae

Key to Species (Polychaeta Errantia)

Arabellidae

1. Parapodia lacking heavy projecting acicular setae; prostomium with 4 eyes in posterior row. . . . . Arabella iricolor
Parapodia with projecting acicular setae; eyes wanting . . . . . (2)

2. Posterior parapodia with prolonged pre- and postsetal lobes. . . . . Drilonereis longa
Posterior parapodia lacking prolonged lobes. . . . . Drilonereis filum

Dorvilleidae

1. Antennae quite long . . . . . *Protodorvillea egena
Antennae short. . . . . (2)

2. Antennae composed of approximately 5-12 articles, rather slender species . . Stauronereis rudolphi
Antennae composed of 7 articles, body rather thick. [Not found in Virginia since described by Webster (1879)]. .Stauronereis sociabilis

Eunicidae

Body heavy, tentacles and parapodia short. . . . . .Marphysa sanguinea
Form slender, tentacles and parapodia proportionately much more elongate . . . . . .*Nematonereis? unicornis

Glyceridae

1. Branchiae digitate, retractile into grooves posterior to bases of notopodia (often retracted-look for groove). . . . Glycera americana
Branchiae not retractile or multilobed. . . . . (2)

2. Branchiae conspicuous as elongate dorsal and ventral lobes of parapodia . . . . Glycera dibranchiata
Branchiae blister-like. . . . . .Glycera robusta

Goniadidae

1. Proboscis provided throughout with sharp, pale teeth as in a molluscan radula . . . . . Glycinde solitaria
Proboscis provided with black chevrons laterally. . . . . (2)

2. Proboscis with about 28 chevrons. Neuropodia with falcigerous and spinigerous setae. . . . . Goniadella gracilis
Proboscis with 4 chevrons. Neuropodia with only spinigerous setae. . .*Goniada falklandica

Hesionidae

Tentacular cirri 6 pairs; color dark. Epifaunal . . . . . Podarke obscura
Tentacular cirri 8 pairs; color light. Apparently infaunal. . . . . .Gyptis vittata

Lumbrineridae

1. Prostomium long, acute, 2 to 3 times longer than wide . . . . . .*Lumbrineris acuta
Prostromium conical but short . . . . . (2)

2. Acicula black, setae with dark bases. . . . . L. fragilis
Acicula yellow, setae pale to yellow. . . . . L. tenuis

[For other species of Lumbrineris which may be expected along the coast, see Pettibone (1963).]

Nephtyidae

1. Branchiae curved inward toward body; eyes conspicuous; proboscis with 14 longitudinal rows of subterminal papillae; dorsal tentacular cirri present. . . . . Aglaophamus verrilli
Branchiae curved outward from body; eyes weak or wanting; proboscis with 22 longitudinal rows of tentacular cirri wanting . . . . . (2)

2. Posterior portion of prostomium with a pair of black eyespots . . . . . .Nephtys magellanica
Eyespots wanting. . . . . (3)

3. Tentacular segment lacking enlarged lamellar neuropodium; notopodium with short dorsal tentacular cirrus. . . . . .N. incisa
Tentacular segment with broad lamellar neuropodium; short ventral tentacular cirrus present, dorsal cirrus lacking. . . . . (4)

4. Dorsal (branchial) cirrus with enlarged lobe at base. Ventral tentacular cirri lateral and continuous with widest part of enlarged tentacular (first) segment . . . . . *N. bucera*

Dorsal cirrus lacking enlarged lobe at base. Ventral tentacular cirri anterolateral, anterior to widest part of enlarged tentacular segment . . . . . *N. picta*

Nereidae

1. Parapodia biramous; ligules present. . . . . (2)
Parapodia uniramous; ligules wanting . . *Lycastopsis pontica*

2. Paragnaths small, few or wanting . . . . . (3)
Paragnaths well developed. . . . . (4)

3. Proboscis only with soft papillae. Peristomial cirri very short. Found in oligohaline shallow areas. . . . *Laeonereis culveri*

Proboscis with paragnaths on maxillary ring only. Polyhaline species . . . . . *Ceratonereis irritabilis*

4. Paragnaths small, pale, pectiniform. Tentacular cirri long, reaching setigers 10-15. Proboscis suboval . . *Platynereis dumerilli*

Paragnaths conical. Prostomium subpyriform, widest posteriorly, narrowed and rounded anteriorly . . . . . (5)

5. Anterior notopodia with 2 conical ligules. Small, uncommon . . . . . *Nereis grayi*

Anterior notopodia with 3 ligules, upper ligule (bearing cirrus) flattened . . . . . (6)

6. Upper ligules of posterior parapodia straplike with cirrus near tip. Large, widespread . . . . . *Nereis succinea*

Upper ligule triangular, with cirrus inserted near base; small, pale worm; very numerous tiny paragnaths in oral ring. . . . . *Nereis arenaceodonta*

Onuphidae

Branchiae strongly spiraled, beginning on setigers 4 or 5. . . . . *Diopatra cuprea*

Branchiae pectiniform, beginning on first setiger. . . . . **Onuphis eremita*

Phyllodocidae

1. Tentacular cirri 2 pairs . . . . . (2)
   Tentacular cirri 4 pairs . . . . . (3)

2. Segment 2 with ventral cirri only, lacking setigerous lobe. Tentacular cirri unequal, ventral pair 2 to 3 times longer than dorsal pair . . . . . Eteone lactea
   Segment 2 with setigerous lobe and setae well developed. Tentacular cirri subequal. . . . . E. heteropoda

3. Prostomium lacking median antenna. . . . . (4)
   Prostomium with median antenna . . . . . *Eumida sanguinea

4. Color solid green in life. Proboscis seldom everted. Associated with oyster beds or mud bottom . . . . . (5)
   Color in distinct pattern. Proboscis often everted. On sandy bottom . . . . . (6)

5. Prostomium subquadrate. Slender species secreting copious mucus. Color mahogany red in alcohol. Common only in association with oysters. . . . . Nereiphylla fragilis
   Prostomium suboval. Body stouter, short, less slimy. Color brown in alcohol . . . . . Paranaitis speciosa

6. Dorsum with spindle-shape dark brown bars. Proboscis with papillae covering base, except middorsally, in close-set crosshatched pattern. Common mesohaline species . . . . . Phyllodoce arenae
   Dorsum with less distinct markings, brown spots forming diffuse longitudinal stripe. Proboscis with papillae in 6 longitudinal rows on either side of base . . . . . P. mucosa

Pilargidae

1. Body subcylindrical, parapodia poorly developed. Dorsal and ventral cirri small. Proboscis with longitudinal rows of spines on basal ring. . . . . Cabira incerta
   Body elongate depressed, with parapodia clearly evident. Dorsal and ventral cirri distinct. . . . . (2)

2. Prostomium inconspicuous, antennae shorter than palps. Tentacular cirri short. Dorsal cirri short, those of first setiger similar to others. Neurosetae with tips slightly bent, smooth, and spinous. Integument papillated. . . . . (3)

Prostomium larger, antennae exceeding palps. Tentacular cirri long. Dorsal cirri long, slender; those of first setiger unusually long. Neurosetae capillary. Integument smooth . . . . . (4)

3. Hooked notopodial setae begin on setiger 3. Eyes present. . . . . *Ancistrosyllis hartmanae*
Hooked notopodial setae begin on setiger 6. Eyes absent . . . . . *A. jonesi*

4. Hooked setae beginning about setiger 23-30 . . . . . *Sigambra wassi*
Hooked setae beginning on setiger 4. . . . . *S. tentaculata*

Polynoidae

1. Lateral antennae terminal on anterior extensions of the prostomium, lacking distinct ceratophores. Elytra 12 or 23+ pairs . . . . . (2)
Lateral antennae ventral to median antenna, ceratophores variably distinct; elytra 15-16 pairs. . . . . (5)

2. Segments numerous (50+); elytra 23+ pairs; commensal with terrebellids. . . . . *Lepidametria commensalis*
Segments few (26); elytra 12 pairs; not commensal with terebellids. . . . . (3)

3. Ventral setae distally bidentate. Elytra quite easily detached. . . . . *Lepidonotus variabilis*
Ventral setae not distally bidentate. Elytra rather firmly attached . . . . . (4)

4. Upper row of notosetae shorter, tips blunt, rest with capillary tips. Last pair of elytra with median notches. Elytral tubercles crowded, low mounded to peaked, size variable. Only record from Eastern Shore. . . . . *L. squamatus*
All notosetae with capillary tips. Posteriormost elytral pair unnotched. Elytral tubercles tiny, widely spaced. Most common. . . . . *L. sublevis*

5. Segments 50-60. Notosetae few (4-10). Probably on *Leptogorgia* . . . . . *Harmothoe acanellae*
Segments 30-47. Notosetae more numerous. . . . . (6)

6. Elytra appear nearly smooth. Segments 30-31. Color rose, white in alcohol. (Probably not in this genus). . . . . *?Harmothoe* sp.
Elytra with nodular to spiny macrotubercles. Segments 36-47. Color in pattern or other than rose. . . . . (7)

7. Segments 36-37. Microtubercles of elytra with tips blunt, pointed or bifid; short fringe of papillae on external border . . . . . .H. extenuata
Segments 37-47. Microtubercles low, flattened, close set, semiglobose; fringe of long papillae on external border. . . . . .*H. nodosa

Sigalionidae

1. Prostomium lacking a median antenna. Elytra with fringe of pinnate papillae on external border. . . . . .*Sigalion arenicolae
Prostomium with median antenna. Elytra with external border smooth or with simple fringe of papillae . . . . . (2)

2. Elytra thick, opaque, with microtubercles; parapodial stylodes short . . . . . .Sthenelais boa
Elytra thin, translucent, delicate, smooth, without microtubercles; anterior parapodial stylodes long and prominent . . . . . S. limicola

Syllidae

1. Body minute, thread-like. Antennae, tentacular and dorsal cirri short, fusiform or subulate. Tentacular cirri 1-2 pairs . . . . . (2)
Body larger. Antennae, tentacular and dorsal cirri longer, filiform or clavate. Tentacular cirri 2 pairs. . . . . (7)

2. Tentacular cirri 1 pair. . . . . (3)
Tentacular cirri 2 pairs, similar to antennae and dorsal cirri. . . . . (4)

3. Tentacular cirri rudimentary, smaller than dorsal cirri. Antennae and dorsal cirri clavate to cylindrical, not inflated at bases . . . . . .Exogone dispar
Tentacular cirri similar to dorsal cirri. Antennae and dorsal cirri wider basally, tapering to slender tips. . . . . (5)

4. Prostomium with pair of minute eye spots in addition to 2 larger pairs. Dorsal cirri present on setiger 2. Blades of compound setae varying in length, tips finely bidentate . . . . . .Brania clavata
Prostomium lacking pair of minute eye spots. Lacking dorsal cirri on setiger 2. Blades of compound setae short, subequal, tips entire. . . . . B. wellfleetensis

5. Palps fused nearly throughout. Body covered with adhesive papillae, often mud encrusted . . . . . Sphaerosyllis erinaceus
Palps fused on basal third. Body smooth, lacking papillae. . . . . (6)

6. Median and lateral antennae considerably beyond palps. Length 2 mm, segments 43. Off Cape Henry, 20 fm. . . . . *Parapionosyllis manca
Median and lateral antennae little longer than or subequal to palps. Prostomium suboval. Length 5 mm, segments to 40. Found at VIMS pier . . . . P. longicirrata

7. Ventral cirri lacking. . . . . (8)
Ventral cirri present. . . . . (11)

8. Stem form with short, subequal dorsal cirri about half length of body width. Sexual stolons produced singly, with head usually forming between setigers 13 and 14 (±1) . . . . . (9)
Stem form with longer dorsal cirri, exceeding half of body width. Stolons formed posterior to setiger 19. . . . . (10)

9, Body with rust-colored transverse bands dorsally, 1 per segment or irregular. [1]*Autolytus fasciatus
Body colorless or with dusky longitudinal stripes. . . . . A. cornutus

10. Stem form with stolons formed in chains of 2 to 8 usually. Stolon with 3 prenatatory setigers. . . . . [1]A. prolifer
Stem form with sex buds apparently formed singly. Stolons with 14 prenatatory setigers. . . . . [1]A. alexandri

11. Tentacular segment with semicircular nuchal hood covering posterior of prostomium. Proboscis with circlet of large recurved teeth . . . . . Odontosyllis fulgurans
Nuchal hood low and crescent-shaped or wanting. Proboscis with single large dorsal tooth. . . . . (12)

12. Antennae and dorsal cirri distinctly moniliform. Proboscis with smooth chitinous rim . . . . . (13)
Antennae and dorsal cirri smooth or indistinctly moniliform. Proboscis with finely denticulated chitinous rim. . . . . Eusyllis lamelligera

[1]Not reported from Virginia but to be expected.

13. Few median segments with heavy, bifurcated simple setae (blades fused to shafts). Dorsal cirri with 7-16 articles. Sexual stolon with three beaded antennae, tentacular cirri 0-3 pairs. . . . . .[1]Syllis gracilis

All setae compound, with long and short distal blades. Dorsal cirri with 11-40 articles. Sexual stolon with a single pair of beaded antennae, tentacular cirri absent . . . . . .S. cornuta

Key to Families (Polychaeta Sedentaria)

1. Prostomium usually at least partly concealed by conspicuous filaments, bristles, pinnate tentacles, or golden setae (paleae) . . . . . (2)

Prostomium not concealed by external structures . . . . . (9)

2. (1) Tentacles pinnate or filamentous . . . . . (3)

Anterior end concealed by flat golden setae or by a cage of long setae pointed anteriorly. . . . . (7)

3. (2) Tentacles feather-like. Habitus usually a tube affixed to a solid substrate . . . . . (4)

Tentacles thread-like, tubes in sediment or lacking . . . . . (5)

4. (3) Tube calcareous. One tentacle forming stout stalked operculum . . . . . .Serpulidae

Tube flexible to sandy (except in minute Fabricia). Operculum lacking . . . . . .Sabellidae

5. (3) Filamentous outgrowth mostly on head. Body divisible into 2 distinct regions. Branched branchiae often present near head . . . . . (6)

Filamentous outgrowths begin behind head, occur on variable number of segments. Lacking branched branchiae. Body not in definite regions. . . . . .Cirratulidae

6. (5) Tentacles retractile into mouth, leaving branchiae extending beyond head . . . . . .Ampharetidae

Tentacles retractile but not inot mouth, thus obscuring prostomium. Branchiae usually present behind filaments. . . . . .Terebellidae

7. (2) Setae forming anterior cage, body densely papillose. Flabelligeridae . . . . Pherusa affinis
Setae (paleae) forming on operculum. Tubes of cemented sand grains . . . . . (8)

8. (7) Tubes conical, of single layer of sand grains. In sediment. Pectinariidae. . . Pectinaria gouldi
Tubes solidly adhered to shells, often aggregated masses. Sabellariidae . . . Sabellaria vulgaris

9. (1) Coiled tentacular processes ("palps") on prostomium (often missing, especially in spionids) . . . . . (10)
Prostomium lacking palps, often indistinct. . . . . (12)

10. (9) Body segments similar (except setiger 5 modified in Polydora). Body similar to that of errant polychaetes, not sharply divided . . . . . Spionidae
Body divided into 2 or 3 distinct regions. . . . . (11)

11. (10) Small. Prostomium spatulate. Tentacles with fringe of lateral papillae near base. Not a tube builder. Magelonidae . . *Magelona rosea
Larger species in leathery or transparent chitinous tubes. . . . . .Chaetopteridae

12. (9) Most body segments longer than wide. . . . . (13)
Segments shorter than, or subequal to, width . . . . . (14)

13. (12) Segments unusually long (hence named "bamboo worms"). Anal segment funneled, flattened, or spatulate. In stiff sand or mud tubes. . . . . .Maldanidae
Segments shorter, anal segment not unusual. Tube "shingled" of quartz grains, hence in sandy areas. Oweniidae . . . . . Owenia fusiformis

14. (12) Parapodia lacking uncinigerous tori. Median antenna present. Dorsal cirri and branchiae strap-like to foliaceous. Small, thread-like worms with mucoid tubes. In soft sediment . . . . . .Paraonidae
Uncinigerous tori or palisaded crotchets present. Median antenna lacking. Worms not tubicolous, mostly larger . . . . . (15)

15. (14) Some segments with uncingerous tori. . . . . (16)
Lacking uncinigerous tori but raised rows of crotchets may be present. . . . . (17)

16. (15) Branchiae lacking or only posterior. Some species minute and pale, some very long and dark red; all thread-like. Abundant . . . . . .Capitellidae
Midregion with 11 pairs of dorsal branchiae. Body thick, dark green. Scarce. Arenicolidae . . . . . .Arenicola cristata

17. (15) Prostomium T-shaped. Branchiae arborescent, 4 pairs. Scalibregmidae. *Scalibregma inflatum
Prostomium pointed. Branchiae more numerous or absent . . . . . (18)

18. (17) Body short, thick, pointed at each end. Parapodia marked only by bundles of simple capillary setae . . . . . .Opheliidae
Body elongate. Parapodia lateral anteriorly; dorsal posteriorly, obscuring dorsum. Active worms in sand, often broken . . . . . .Orbiniidae

Key to Species (Polychaeta Sedentaria)

Ampharetidae

1. Dorsal hooked setae behind branchiae; ventral collarette present; abdominal region long, about 50 segments. . . . . .*Melinna maculata*
   Dorsal hooked setae wanting; ventral collarette absent; abdominal region shorter, 13-25 segments . . . . . (2)

2. Paleae few, delicate; thoracic setigers 17; setae long; abdominal segments 22-25. .*Lysippides grayi*
   Paleae wanting; thoracic setigers 14 or 15; abdominal segments 13 or 29-31 . . . . . (3)

3. Thoracic setigers 14, abdominal segments 29-31. . . . . *Asabellides oculata*
   Thoracic setigers 15, abdominal segments 13 . . . . . *Samythella elongata*

Capitellidae

1. Capillary setae restricted to first 5 setigers. . . . . *Heteromastus filiformis*
   Capillary setae not restricted to first 5 setigers . . . . . (2)

2. Capillary setae on first 7 setigers . . *Capitella capitata*
   Capillary setae on first 11 setigers . *Notomastus latericius*

Chaetopteridae

Tube long, chitinous, annulated; buried vertically in the sand; body thin, with 2 very long ciliated, grooved palps . . . . . *Spiochaetopterus oculatus*
Tube U-shaped, opaque, openings narrow; body large, with 2 short filiform palps. . . . . *Chaetopterus variopedatus*

Cirratulidae

Pair of thick, long palps; branchial filaments less than 1/3 body length; small species in sand-silt . . . . . *Tharyx setigera*
Paired palps lacking; branchial filaments 1/3 or more of body length; larger species in silt-clay . . . . . .*Cirriformia filigera*

Maldanidae

1. Anus dorsal to pygidial disc; anterior segments biannulated; anal papillae lacking. Cephalic limbate plate circular . . . . . *Maldanopsis elongata*

   Anus terminal, in center of funnel-like pygidium; margin of funnel papillate; biannulation absent . . . . . (2)

2. Setigers 18; deep membranous collarette on setiger 4. . . . . *Clymenella torquata*

   Setigers more than 18; collarette on setiger 4 wanting or poorly developed. . . . . (3)

3. Segments variable, 18-70; collarette on setiger 4 wanting; angle of prostomium 65° . . . . . *C. zonalis*

   Number of segments 22; collarette on setiger 4 only a fleshy rim; angle of prostomium 45°. . . . . *C. mucosa*

Opheliidae

Body rounded, cylindrical, grub-like; ventral groove wanting; branchiae begin setiger 2. . . . . *Travisia carnea*

Body rounded anteriorly; ventral groove posteriorly; branchiae begin setiger 11 or 12 . . . . . *Ophelia bicornis*

Orbiniidae

1. Branchiae begin on setiger 5. Large, heavy species . . . . . *Orbinia ornata

   Branchiae begin on setigers 9-32. Species long but more slender. . . . . (2)

2. Ventral papillae on some anterior segments (especially 14-24). . . . . *Scoloplos riseri*

   Lacking ventral papillae. . . . . (3)

3. Transitional zone of body with 2-3 subpodial papillae, followed by entire (often undulate) subpodial flange . . . . . *S. robustus*

   Transitional area with 2 subpodial papillae, continuing posteriorly as subpodial lobes . . . . . *S. fragilis*

Paraonidae

Antenna short, not exceeding subulate setiger 2; nuchal slits lateral to antenna; 2 lateral anal cirri. . . . . *Aricidea jeffreysii*

Antenna long, to setiger 3 or 5, jointed distally; nuchal slits posterolateral to antenna; 3 anal cirri. . . . . *A. wassi*

Sabellidae

1. Paired eyes on setiger 1 and pygidium; setigers 10-12, collarette poorly developed; tube of mucoid-mud, transitory, on solid substrates. . . . . *Fabricia sabella*

   With or without eyes on branchial filaments; setigers more than 12; collarette well developed; tube membranous or stiff, with some agglutinated sand and mud . . . . . (2)

2. Collarette 4-lobed; row of 1-8 conspicuous eyespots on branchial filaments, body long and thin . . . . *Potamilla reniformis*

   Collarette bilobed; eyes present or wanting, body heavier. . . . . (3)

3. Two irregular rows of eyespots on branchial filaments; collarette bilobed, widely separated mid-dorsally, deeply notched mid-ventrally; body short and thick . . . *Sabella microphthalma*

   No eyespots on branchial filaments; collarette bilobed, deeply notched mid-dorsally, slit mid-ventrally. . . . . *Potamilla neglecta*

Spionidae

1. Fifth setiger with heavy, retractable setae. (*Polydora*). . . . . (2)

   Fifth setiger unmodified . . . . . (5)

2. (See Hartman, 1945, 1951) Notopodia of posterior segments with modified hooks. Found in bivalve shells . . . . . *Boccardia hamata*

   Posterior notopodia lacking special hooks. . . . . (3)

3. Pygidium papillose, branchiae beginning on setiger 6. In columella of shells carried by hermit crabs. . . . . .P. commensalis
Pygidium a shallow-conic disc; branchiae beginning on setiger 7 . . . . . (7)

4. Median occipital antenna present; branchiae present on about 14 segments; tubes mud-mucoid, on solid substrates. . . . . .P. ligni
Median antenna lacking; branchiae on about 100 segments; boring in bivalve shells, especially those of live oysters . . . . . P. websteri

5. Prostomium acutely pointed. (Scolelepis) . . . . . (6)
Prostomium conical, rounded or truncate . . . . . (7)

6. (See Pettibone, 1963) Neuropodial lamellae bilobed posteriorly, with neurosetae and hooks between the lobes, the lower lobe ("ventral cirrus") smaller. Larger species; in shallow sandy areas . . . . . Scolelepis squamata
Neuropodial lamellae entire, lacking distinct ventral lobe. Small species; in soft silt-clay of deeper water. . . . . S. bousfieldi

7. Prostomium conical; accessory branchiae on posterior segments. Known only from Woods Hole, Mass., and northern Gulf of Mexico . . . . . Dispio uncinata
Prostomium rounded or truncate; accessory branchiae lacking. . . . . (8)

8. Prostomium T-shaped (with lateral horns). . . . . (9)
Prostomium truncate or rounded but lacking lateral horns. . . . . (10)

9. Branchiae absent; tube firm, of sand; in shallow, sandy areas meso- to polyhaline. Small, whitish species. . Spiophanes bombyx
Branchiae on first setiger to 1/2 to 2/3 of body; tube fragile, seldom noticed; in sandy-mud and detritus, most common in oligohaline areas. Larger species with dark green body, red branchiae. . . . . .Scolecolepides viridis

10. Branchiae 1 pair; setiger 2 with dorsal collar. . . . . Streblospio benedicti
Branchiae 4 or more pairs; collar lacking. . . . . (11)

11. Branchiae present from setiger 1 to end of body. (Spio) . . . . . (12)
Branchiae 5-9 pairs . . . . . (13)

12. Ventral lamellae much reduced; neuropodial hooded crotchets about 16. Sand tube thick, fragile, in shallow sand . . . . . Spio setosa
Ventral lamellae little reduced; hooded crotchets usually 6 . . . . . S. filicornis

13. Branchiae 4 pairs . . . . . (14)
Branchiae 5-9 pairs . . . . . (15)

14. Prostomium snout-like, bordered by flap-like lobes of peristomium. Medium-sized estuarine species with green, pinnate branchiae. . . . . .Paraprionospio pinnata
Prostomium broad and flattened anteriorly, not bordered by peristomial extension. Small, thread-like, offshore species . . . . . *Prionospio malmgreni

15. Branchiae 5 pairs; posterior pair of eyes crescentic. In sand near shore . . P. heterobranchia
Branchiae 9 pairs (elsewhere 6 to 12); posterior eyes larger, but not crescent-shaped. In softer bottom . . . . . .P. cirrifera

Terebellidae

1. Dorsal branchiae 1-3 pairs posterior to tentacular filaments; thoracic region heavy . . . . . (2)
Lacking anterior branchiae; body less stout, fragile... . . . . (6)

2. One pair of arborescent branchiae; eyespots numerous. . . . . .Pista maculata
Two to three pairs of unequal branchiae; eyespots wanting. . . . . (3)

3. Three pairs of arborescent branchiae. . . . . (4)
Two pairs of spiral or arborescent branchiae. . . . . (5)

4. First pair of branchiae largest; lateral buccal lobes large . . . . . Loimia medusa
Arborescent branchiae subequal; lateral lobes wanting. . . . . Amphitrite ornata

5. Branchiae spirally branched, forming a compact oval red pompom. . . . . .Pista cristata
Branchiae arborescent, with large main trunk, green, subequal . . . . . .P. palmata

6. Parapodia dendritic, branching in mid-body region; setae on all segments; body blood-red . . . . . .Enoplobranchus sanguineus
Parapodia not branching; with or without setae; pale orange-yellow to blood red. . . . . (7)

7. Setae wanting; very soft, fragile; pale orange-yellow . . . . . Lysilla alba
Dorsal setae capillary; ventral uncini present. Body hidden by tentacular mass; blood red, circulating in tentacles . . . . . Polycirrus eximius

Brief Glossary

Aciculum--Strong seta supporting a parapodium internally.

Ceratophore--Base of antenna.

Cirri--Slender appendages of anterior segments or parapodia.

Crotchet--Curved seta notched at distal end.

Elytra--Dorsal, stalked scales.

Filiform--Thread-like.

Foliaceous--Leaf-like, flat.

Fusiform--Spindle-shaped.

Lamellar--Plate-like, but not leaf-like.

Ligule--Strap-like parapodial lobe.

Macro- and micrognaths--Dark, chitinous proboscidial teeth.

Moniliform--Constricted regularly to resemble string of beads.

Neuro- and notopodium--Upper and lower lobe of parapodium.

Nuchal organs--Two dorsal, glandular pits on first segment of some polychaetes.

Paleae---Anteriorly directed setae lateral to head.

Palp--Fleshy projection from prostomium.

Peristomium--Generally first complete segment.

Pinnate--Feather-like.

Prostomium--Above mouth, only half segment.

Pygidium--Anal segment.

Setae--Needle- or hair-like extensions of integument. Capillary setae--slender, hair-like. Limbate setae--bordered.

Subulate setae--Awl-shaped.

Stylode--Parapodial fringe.

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Gastropods

Key to Some Marine Gastropods of Virginia

John Kraeuter

1. Shell not present . . . . . .Order Nudibranchia (2)
   Shell present . . . . . (4)

2. (1) Body without cerata, but ciliated; eyes on side of head; anus median or dorsolateral. . . . . (2 sp.) Elysiidae
   Not as above. . . . . (3)

3. (2) Branchial plumes in circle, retractile into cavity; body yellow, papillate, thick. . . . . Onchidoridae, Acanthodoris pilosa
   No branchial plumes in a circle; body round, small, thin; with retractile rhinophores . . . Corambidae, Corambella depressa

4. (1) Shell patellate, cap-shaped, or tubular; not spirally coiled for at least one complete turn . . . . . (5)
   Shell spirally coiled for at least one complete turn. . . . . (7)

5. (4) Shell tubular, minute; closed at top by a septum. . . . . Caecidae, Caecum pulchellum
   Shell cap-shaped or patellate . . . . . (6)

6. (5) Shell patellate, having a slot or keyhole-like aperture penetrating the shell at the apex. . . Fissurellidae, Diadora cayenensis
   Shell cap-shaped or patellate; no keyhole-like aperture at the apex. . . (4 sp.) Calyptraeidae

7. (4) Shell bulloid, cylindrical, lenticular, or obconic; spire sunken or at most moderately elevated; aperture not extremely large if lenticular. . . . . (8)
   Not as above. . . . . (13)

8. (7) Shell lenticular. . . . . (9)
   Shell otherwise . . . . . (10)

9. (8) Shell with a narrow deep umbilicus, and a nearly smooth exterior . . Skeneidae, Skenia planorbus
   Shell with a wide umbilicus and either axial riblets or an umbilical callus at some point . Vitrinellidae, Teinostoma cryptospira

10. (8) Shell bulloid; spire concealed; aperture as long as shell. . . .Atylidae, Haminoea solitaria
Shell otherwise . . . . . (11)

11. (10) Shell obconic . . . . . .(2 sp.) Ellobiidae
Shell cylindrical . . . . . (12)

12. (11) Spire apparent, slightly or moderately elevated; aperture not full length of shell . . .Retusidae, Retusa canaliculata
Spire sunken or concealed; aperture full length of shell. . . . . .Scaphandridae, Cylichna alba

13. (7) Shell sinistral (left-handed); size minute. . . . . .Triphoridae, Triphora perversa
Shell dextral (right-handed); size variable. . . . . (14)

14. (13) Siphonal canal or notch not present; margin entire . . . . . (15)
Siphonal canal or notch present; margin not entire. . . . . (20)

15. (14) Shell turriform or turbinate. . . . . (16)
Shell otherwise . . . . . (18)

16. (15) Shell surface smooth, shiny; sutures nearly invisible; color white. . . . . .Melanellidae, Melanella intermedia
Surface not shiny; sutures well defined . . . . . (17)

17. (16) Whorls well rounded; definite axial ribs . . . . . (2 sp.) Epitoniidae
Whorls not well rounded; or axial ribs absent; shells minute . . . . . .(7 sp.) Pyramidellidae

18. (15) Shell minute, white, body whorl marked on lower half with numerous revolving lines composed of punctate dots; size ¼ inch or less . . . . . Acteonidae, Acteon punctostriatus
Shell without punctate lines; larger than ¼ inch . . . . . (19)

19. (18) Umbilicus not present; heavy shell; may have spiral rows of brown dots when wet. Found mostly in marshy areas on blades of Spartina . . . . . .Littorinidae, Littorina irrorata
Umbilicus present, no spiral rows of brown dots . . . . . (4 sp.) Naticidae

20. (14) Shell minute, turriform; inconspicuous short anterior canal or notch; whorls ornamented by spiral sculpture of spiral tubercles . . . . . (4 sp.) Cerithiidae
Size variable, but if minute not turriform or the spiral sculpture has been replaced by varices or ribs so only final spiral lines are present . . . . . (21)

21. (20) Anterior canal reduced to a notch or nearly so . . . . . (22)
Anterior canal not reduced to a notch. . . . . (24)

22. (21) Shell turriform, augerlike, long, slender, and coiled with a sharp apex; body whorls approximately 15 . . . . . Terebridae, Terebra dislocata
Shell generally ovate; pear-shaped; body whorls less than eight. . . . . (23)

23. (22) Columella denticulate; aperture long and narrow. . . . Marginellidae, Marginella denticulata
Columella not denticulate; aperture oval. . . . . (3 sp.) Nassariidae

24. (21) Shell large, fusiform; anterior canal long; body whorl at least two-thirds total length. . . . . .(2 sp.) Melongenidae
Shell size variable; anterior canal short to moderately long; body whorl less than two-thirds total length . . . . . (25)

25. (24) Shell small, outer lip thickened and inner surface of lip denticulate; exterior polished . . . . (3 sp.) Columbellidae
Shell size variable, surface not polished; outer lip lacking denticulations . . . . . (26)

26. (25) Small shells, outer lip having a slit or notch at the upper angle near but not on the suture; siphonal canal reduced . . . . . .(3 sp.) Turridae
Size variable; outer lip lacking a slit or notch at the upper angle, but may be on the suture, forming a distinct anal canal in some species; in others this is lacking; all have a conspicuous siphonal canal . . . . . (3 sp.) Muricidae

Calyptraeidae

1. Shell partially divided within by a nearly horizontal partition. . . . . Crepidula (2)
   Shell oval; internal partition cap-shaped, not horizontal . . . . . Crucibulum striatum

2. Shell convex or flat; interior and exterior white . . . . . Crepidula plana
   Shell convex, high backed; interior polished, mottled purple-brown mixed with white . . . . . (3)

3. Horizontal partition concave. . . . . Crepidula fornicata
   Horizontal partition convex . . . . . Crepidula convexa

Cerithiidae

1. Siphonal canal small but definite . . . . . (2)
   Siphonal canal formed only as a notch . . . . . (3)

2. Shell with three strong squarish spiral cords per whorl, may be four on last whorl . . . . . .Seila adamsi
   Shell with two to three rows or large beads per whorl. . . . . Cerithiopsis greeni

3. Last 1/3 of body whorl with sculpturing; apertural lip flaring and rounded. . . . . Bittium alternatum*
   Last 1/3 of body whorl without sculpturing; apertural lip squarish. . . . . Bittium varium*

*It is almost impossible to separate these two without comparison material.

Columbellidae

1. Shell with axial ribs or plications . . . . . Anachis (2)
   Shell without axial ribs or plications. . . . Mitrella lunata

2. Shell with about 12 axial ribs on upper ½ of whorl; spiral lines weak or lacking . . . . . Anachis avara
   Shell with about 24 axial ribs on entire whorl; spiral lines strong. . . . Anachis translirata

Ellobiidae

1. Shell biconic; single denticulation horizontal and equal in height to the columellar fold. . . . . .Detracia floridana
   Shell less biconic, more cone-shaped; two upturned denticulations shorter than the upturned columellar fold. . . . Melampus bidentatus

Elysiidae

1. Median white line between tentacles; white marks behind tentacles . . . . . *Elysia catula*
   No median line between tentacles; head distinct, with neck-like connection to body . . . . . *Elysia chlorotica*

Epitoniidae

1. Shell with subcontinuous ribs; heavier more elevated ribs at intervals; no fine lines between ribs . . . . . *Epitonium rupicolum*
   Shell with continuous ribs; all ribs nearly the same; fine spiral lines between ribs . . . . . *Epitonium multistriatum*

Melongenidae

1. Shell heavy; shoulder with low strong tubercles; felt-like periostracum and channeled suture lacking. . . . . *Busycon carica*
   Shell thinner; no or very small light tubercles on shoulder with tubercles lacking or small and weak; felt-like periostracum present; suture with wide channel. . . . . *Busycon canaliculatum*

Muricidae

1. Shell with both anal canal and siphonal canal . . . . . *Thais haemastoma*
   Shell lacking anal canal or notch, but with siphonal canal. . . . . (2)

2. Siphonal canal nearly closed; aperture small, rounded; outer lip heavy. . . . . *Eupleura caudata*
   Siphonal canal more or less open for its full length; outer lip relatively thin . . . . . *Urosalpinx cinerea*

Nassariidae

1. Outer lip thin and sharp. . . . . *Nassarius trivitattus*
   Outer lip not thin and sharp. . . . . (2)

2. Shell heavily eroded, forming axial ridges in older specimens, often covered with a light coat of green alga; shell brown-black; aperture deep purple in young . . . . . Nassarius obsoletus
Shell light colored, gray to gray-brown; beaded; no axial ridges from erosion and no algal mat; outer lip heavy. . . . . Nassarius vibex

Naticidae

1. Shell depressed; aperture extremely large; spire minute; interior white covered with waved spiral lines. . . . . Sinum perspectivium
Shell not depressed; aperture not abnormally large . . . . . (2)

2. Umbilicus round, not large, only slightly covered by a callus . . . . . Lunatia heros
Umbilicus more than slightly covered by a callus. . . . . (3)

3. Callus button-like, brown, almost covering deep umbilicus. . . . . .Polinices duplicatus
Callus flat, usually white, covering umbilicus except for a chink-like opening; animal small. . . . . Tectonatica pusilla

Pyramidellidae

1. Shell sculpture predominantly axial ribs . . . . . .Turbonilla (2)
Shell sculpture not predominantly axial ribs . . . . . (3)

2. Shell with spiral lines between axial ribs . . . . . Turbonilla interrupta
Shell without spiral lines between axial ribs . . . . . .Turbonilla stricta

3. Shell with tubercles; smooth spiral keel situated just above the suture. . . . . Odostomia dux
Shell without tubercles . . . . . (4)

4. Shell with spiral groove or grooves . . . . . (5)
Shell without spiral grooving or grooves. . . . . (6)

5. Shell with 1 spiral groove parallel with suture; white to gray . . . . . Odostomia bisuturalis
Shell with three deeply cut spiral grooves; white . . . . . .Odostomia impressa

6. Suture crenulate; white . . . . . Pyramidella candida
Suture not crenulated; brown. . . . . Pyramidella fusca

Turridae

1. Ten axial ribs tapering off toward the sutures; spiral sculpture fine . . . . . Mangelia cerina
Eleven or twelve axial ribs; spiral sculptures strong, often producing a beaded effect. . . . . .Mangelia plicosa

Pycnogonida

Key to the Pycnogonida of Virginia

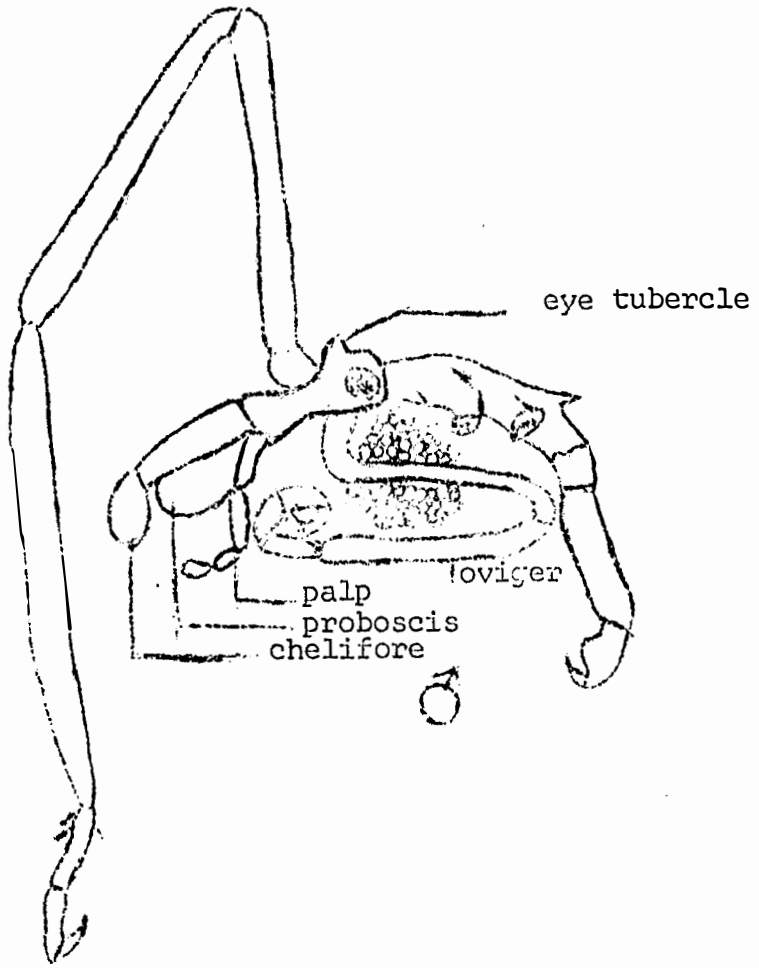
John McCain

1. Chelifores and palpi absent. Endeidae. . . . . Endeis spinosa
   Either chelifores or palpi present. . . . . (2)

2. (1) Chelifores absent; palpi 5 or 6-jointed. Tanystylidae . . . . . .Tanystylum orbiculare
   Chelifores large, 2-jointed; palpi absent . . . . . (3)

3. (2) Ovigers 10-jointed in both sexes. Pallenidae . . . . . .Callipallene brevirostris
   Ovigers less than 10-jointed, only in males. Phoxichilidiidae. . . . . (4)

4. (3) Cephalic segment overhanging proboscis by at least half its length; body slender, segments well separated . . . .Anoplodactylus parvus
   Cephalic segment short, reaching little beyond base of proboscis; body robust, segments not well separated. . . . . .Anoplodactylus pygmaeus



Crustaceans
General Key

Key to Some Common Groups of Crustacea

James Curtis

1. Firmly attached, either to solid substrate or rarely as a parasite that is partly internal; exclusively marine. . . . . Subclass Cirripedia (2)
   Free-living or, if parasitic, generally external. . . . . (3)

2. (1) Substrate and commensal barnacles with 6 pairs of well developed cirri; mantle usually covered with calcareous plates. . . Order Thoracica
   Naked barnacles parasitic on decapod crustaceans (Fig. 8), a few parasitic on tunicates; appendages absent . . . . . .Order Rhizocephala

3. (1) Body appendages numerous, with a flattened, leaf-like structure (except in Cladocera); appendages on first 11-19 segments; eyes present; largely fresh-water . . . . . Subclass Branchiopoda (4)
   Body appendages not flattened and leaf-like . . . . . (6)

4. (3) Carapace lacking (Fig. 2). . . . . Order Anostraca
   Carapace present . . . . . Order Diplostraca (5)

5. (4) Bivalve shell absent; trunk segments 10-32, each bearing a pair of appendages (Fig. 3). . . . . .Suborder Cladocera
   Bivalve shell present; external segmentation absent, appendages 5-6 pairs (see 7) (Fig. 4). . . . . Suborder Conchostraca

6. (3) Appendages on first 9 segments similar, with the basal section of each appendage bearing a large, flattened, outer pseudepipodite giving the limb a triramous rather than the usual biramous structure; eyes absent; rare (only three species in two genera); marine, shallow water infauna (Fig. 6). . . . . .Subclass Cephalocarida
   General structure otherwise. . . . . (7)

7. (6) Bivalve carapace enveloping body and head, externally resembling the Suborder Conchostraca but differing in smaller size (not more than 2-3 mm) and in smaller number of appendages (Fig. 5) . . .Subclass Ostracoda
   Carapace absent or present, but covering at most the thoracic region. . . . . (8)

8. (7) Eye simple, usually single, occasionally double . . . . . (9)
Eyes compound, paired. . . . . (15)

9. (8) Very small crustaceans (less than 1 mm to several mm in length); abdominal region without appendages. Parasitic forms with range of modifications from near typical copepod-type to vermiform shapes with eyes absent (fish ectoparasitic); marine and freshwater. . . . . Subclass Copepoda (10)
Elongate cylindrical body divided, as in copepods, but the thoracic segment bearing maxillipeds is not fused with the head. Both antennae long and prominent, mouth appendages more elongate than in copepods and provided with setae; marine (Fig. 7). .Subclass Mystacocarida

10. (9) Free-swimming and benthic, with few exceptions. . . . . (11)
Parasitic and commensal, with few exceptions. . . . . (13)

11. (10) First antennae with 23-25 segments, often longer than the body; movable articulation between 5th and 6th thoracic segments (Fig. 9). . . . . Order Calanoida
First antennae never more than 17 segments, not as long as body . . . . . (12)

12. (11) Body cyclopoid, metasome markedly wider than urosome (Fig. 10a); basal segment of 5th leg without an inner expansion (Fig. 10b); eggs carried in lateral ovisacs. . . . . .Order Cyclopoida
Body more or less cylindrical, urosome about as wide as metasome (Fig. 11a); basal segment of 5th leg with inner expansion (Fig. 11b); eggs carried in a single ovisac . . . . . Order Harpacticoida

13. (10) Eggs carried in a dorsal brood pouch; frequently found as commensals in ascidians (Fig. 12) . . . . . Order Notodelphyaidea
Fresh and saltwater ectoparasites of fish. . . . . (14)

14. (13) Body of both sexes segmented; attachment usually by second antennae (Fig. 13). . . . . Order Caligoida
Body of female not segmented, or only partially; attachment by second maxillae (Fig. 14) . . . . . .Order Lernaeopodoida

15. (8) Dorsoventrally flattened ectoparasites of fish with suctorial mouth and limbless abdomen; marine and freshwater (Fig. 1). . . . . Subclass Branchiura
Free-swimming or crawling forms; abdomen with appendages except where greatly reduced (as in crabs); marine, freshwater and terrestrial. . . Subclass Malacostraca (16)

16. (15) Abdomen composed of 8 segments; large carapace present. . . . . .Series Leptostraca
Abdomen of 7 segments or less . . . . . .Series Eumalacostraca (17)

17. (16) Carapace, when present, not covering entire thorax . . . . . (18)
Carapace covering entire thorax. . . . . Superorder Eucarida (19)

18. (17) Abdomen not wider than cephalothorax. . . . . Superorder Peracarida (20)
Abdomen very large, wider than small cephalothorax (Fig. 15) . . . . . Superorder Hoplocarida, Order Stomatopoda

19. (17) Thoracic appendages all biramous (Fig. 16) . . . . . .Order Euphausiacea
Thoracic appendages not all biramous. . . . . .Order Decapoda

20. (18) Body with shrimp-like form, distinct carapace over thorax and elongated abdomen . . . . . (21)
Body having thorax and abdomen not sharply distinguishable; carapace lacking or very small . . . . . (22)

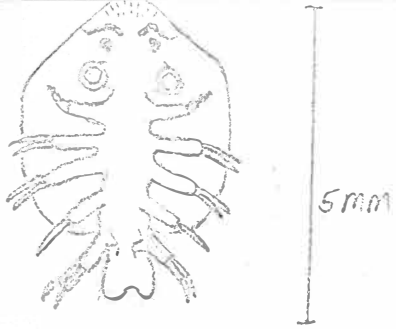
21. (20) Eyes stalked when present; carapace covering all or most of thorax; swimming forms. . . . . Order Mysidacea
Eyes sessile when present; carapace covering only 3 or 4 thoracic segments and inflated into a branchial chamber on each side; marine, in bottom sediments (Fig. 18). . . . . Order Cumacea

22. (20) Carapace present, small, covering only 2 thoracic segments; like small isopods but with 1st pair of legs chelate; mostly marine (Fig. 22). . . . . .Order Tanaidacea
Carapace lacking . . . . . (23)

23. (22) Body usually dorsoventrally flattened; thoracic legs (except for maxilliped) essentially alike; abdomen with 5 pairs of pleopods having unsegmented rami and one pair of uropods; mostly marine, some freshwater and terrestrial (Figs. 17, 20). . . . . Order Isopoda

Body usually laterally compressed; thoracic limbs of more than one form, with the 2nd and 3rd pairs usually prehensile; abdominal appendages consist of 3 pairs of pleopods and 3 pairs of uropods; marine and freshwater species (Figs. 19, 21, 23). . . . . Order Amphipoda

Fig. I



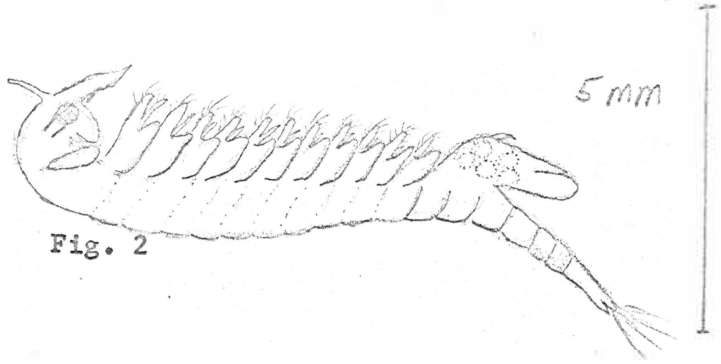


Fig. 2

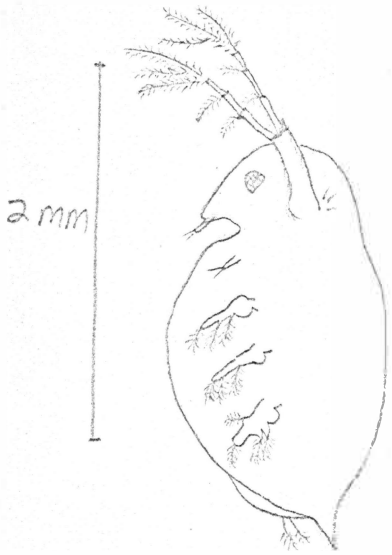
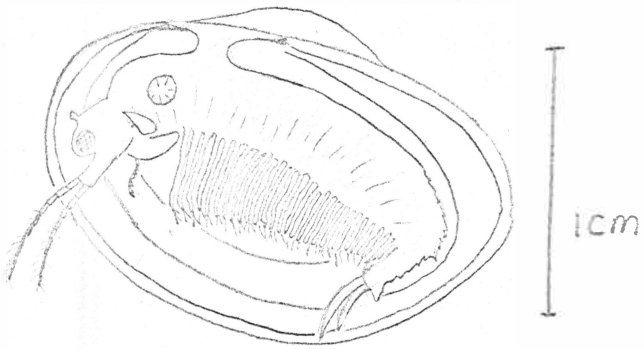


Fig. 3

Fig. 4



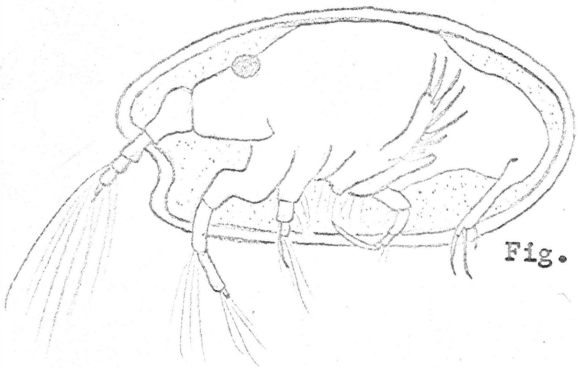


Fig. 5

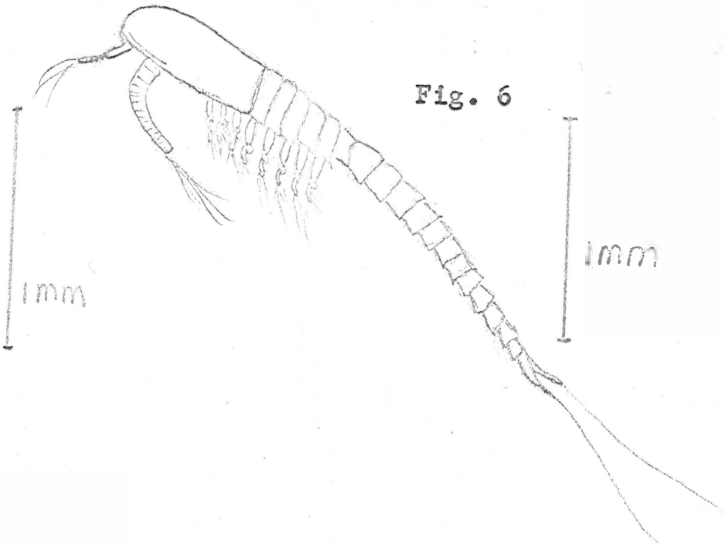


Fig. 6

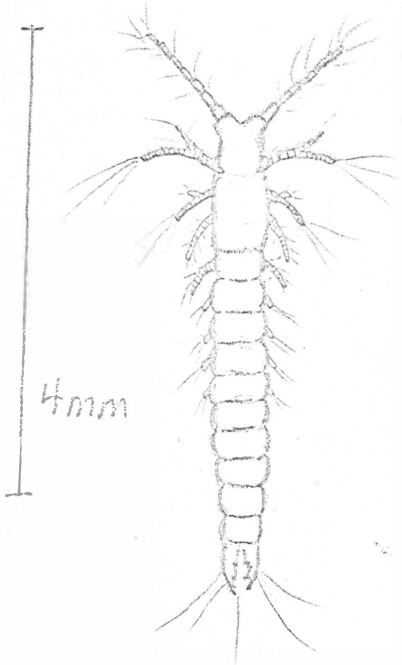
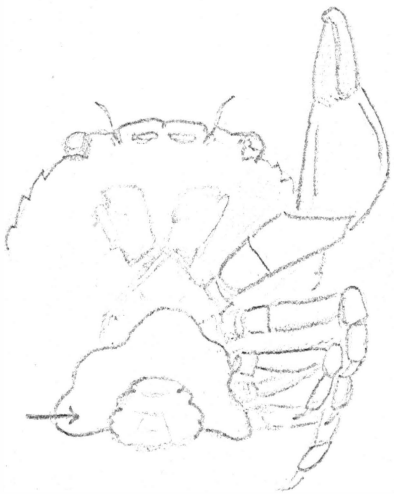


Fig. 7

Fig. 8



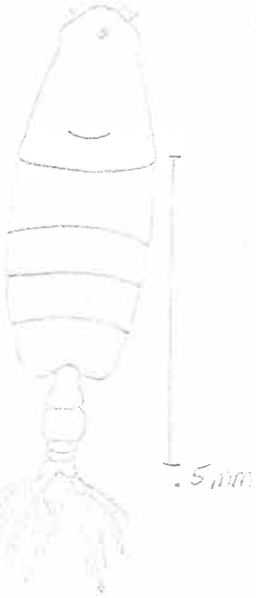


Fig. 9

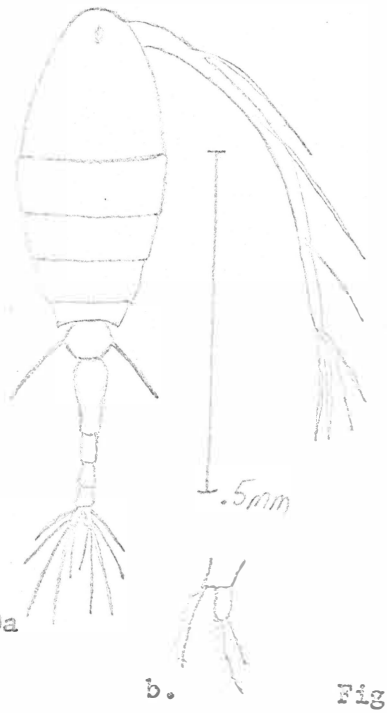


Fig. I0a

b.

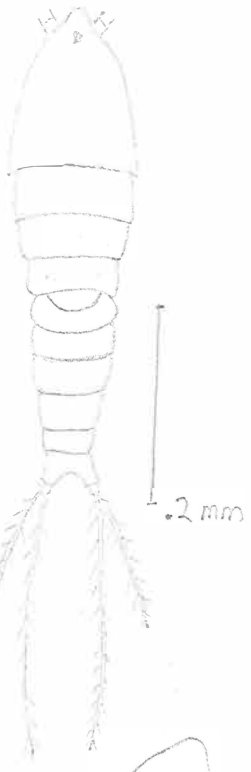


Fig. IIa

b.

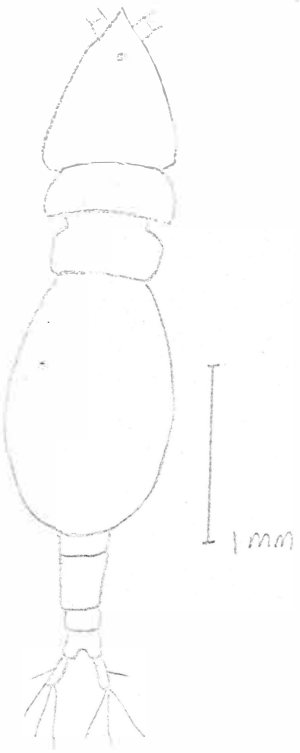


Fig. I2

Fig. I3

Fig. I4

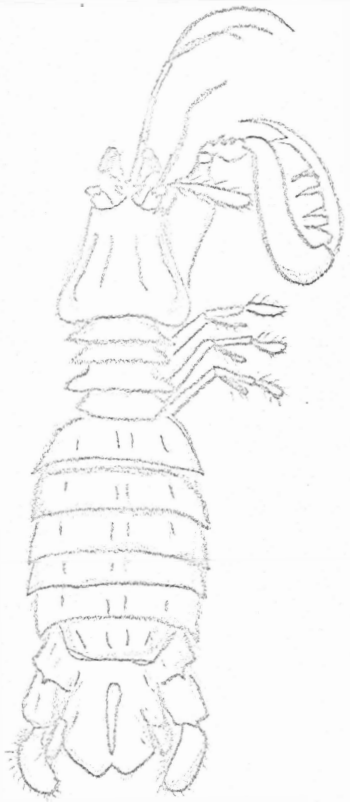


Fig. I5

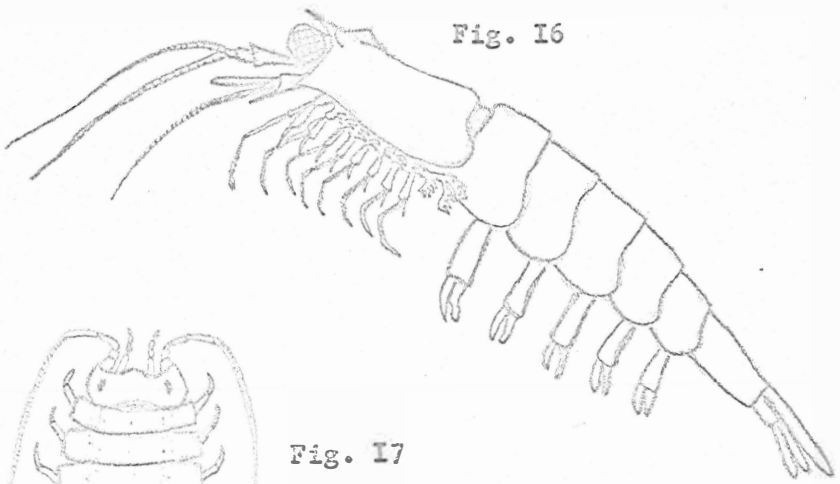


Fig. I6

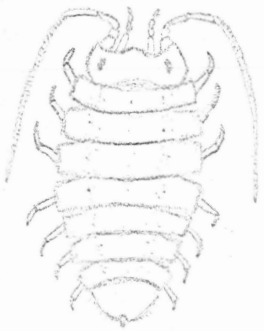


Fig. I7

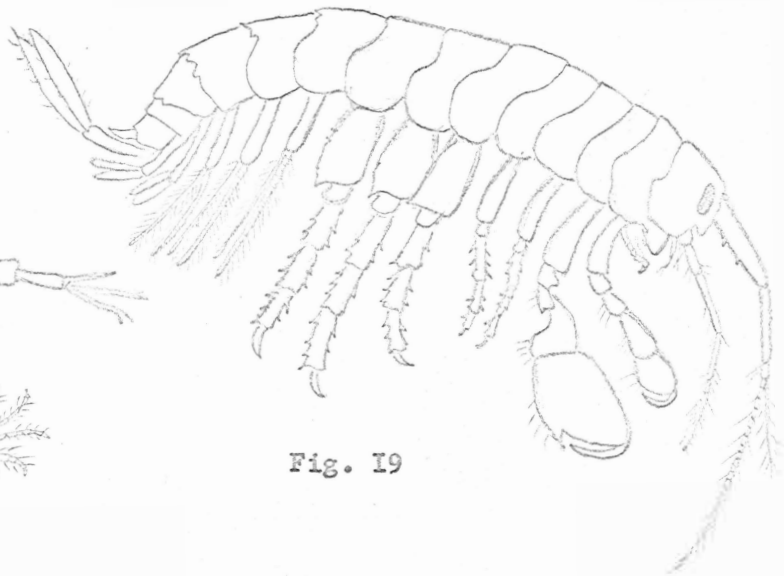


Fig. I9

Fig. I8

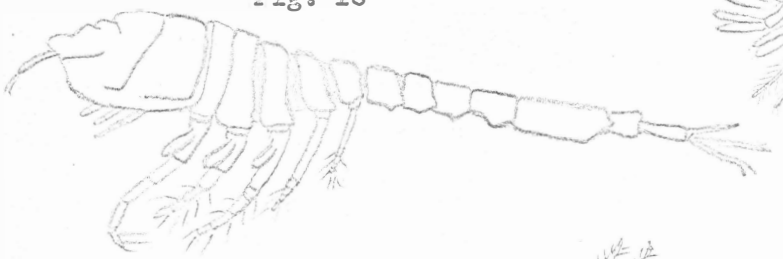


Fig. 20

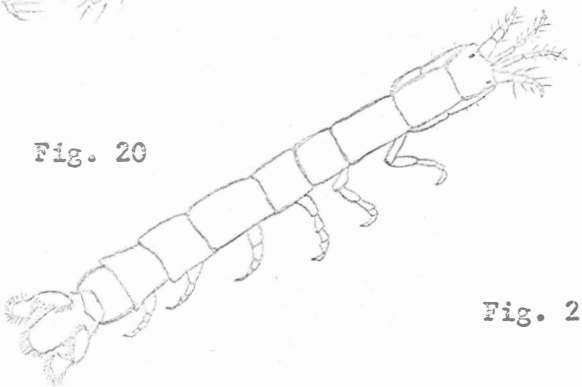


Fig. 2I

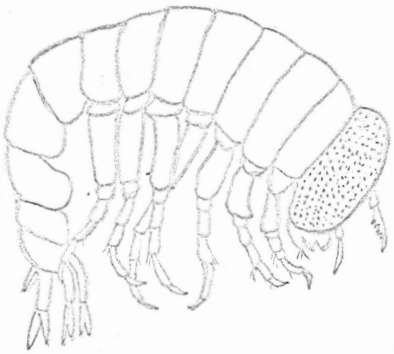
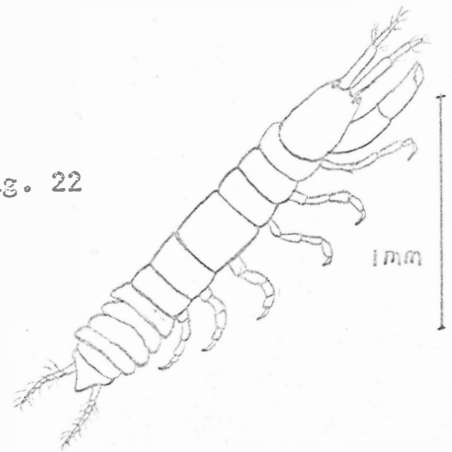


Fig. 22



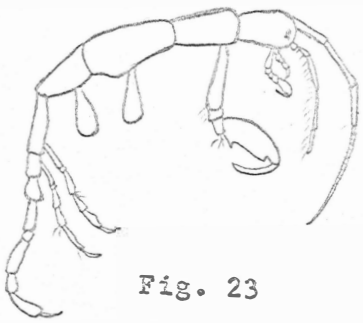


Fig. 23

Cumaceans

Key to Virginia cumaceans compiled
by
John McCain

1. Telson distinct, Diastylidae.....(2)
   Telson not distinct.....(3)

2. (1) Telson tapering to an acute point without apical spines...
   .....Oxyurostylis smithi
   Telson rounded with apical spines.....Diastylis polita

3. (1) Male with 2 pairs of pleopods, inner branch of uropod binomial, Leuconidae.....Leucon nasica
   Male with 3 or more pairs of pleopods, inner branch of uropod monomial, Bodotriidae.....(4)

4. (3) Male with three pairs of pleopods.....Leptocuma minor
   Male with five pairs of pleopods.....Cyclaspis varians

Crustaceans
Glossary

Glossary of Terms Used in Describing Isopods, Amphipods and Decapods

Compiled by James Feeley

Abdomen--Posterior region of body, typically composed of six segments. Segments may be fused in some decapods and isopods.

Accessory flagellum--Small branch composed of one to several articles on the first pair of antennae at the junction of the peduncle and flagellum.

Acuminate--Tapering to a slender point, pointed.

Allotype--A paratype specimen designated in the original description of a species as the type of the sex other than that of the holotype.

Annulated--Composed of many articles.

Antenna--A movable, segmented appendage located on the head, comprised of a flagellum and a peduncle. May be sensory in function.

Antennary gland--Cone-shaped excretory gland located on ventral surface of second antenna's basal joint in amphipods; antennal gland.

Antennule--One of the first pair of antennae.

Apical--Referring to the tip of a structure.

Apophysis--Any calcareous process, outgrowth, or swelling.

Approximate--Close together, juxtaposed.

Article--Segment of any jointed structure, e.g., a segment of a flagellum.

Articulation--Juncture between two segments; joint.

Basis--Second segment from proximal end of a thoracic appendage; basal joint, basal plate, basium, basipodite.

Biarticulate--Composed of two articles.

Binomial--In two parts, e.g., biramous.

Biramous--Divided into two branches, e.g., an endopodite and exopodite, which originate from a basal protopodite.

Branchia--Respiratory structure; gill.

Brood pouch--Structure formed by the oostegites and which contains the externally laid eggs until hatching; marsupium.

Buccal mass--Mouth and mouth parts combined.

Calceolus--Calcareous tubercle found on antennae of certain amphipods. Function not known, may be sensory.

Carapace--Fused exoskeletal plates covering the head and thoracic segments. Missing in isopods and amphipods, present in decapods.

Caridoid--Shrimp-like.

Carina--Ridge.

Carinate--Shaped like the keel or prow of a ship.

Carpus--Fifth segment from proximal end of a thoracic appendage.

Cephalon--Head region of body.

Cephalothoracic shield--Plates covering the cephalothorax; carapace, dorsal shield.

Cephalothorax--Head, plus the first one or two thoracic segments in isopods, the head plus the first thoracic segment in amphipods, and the entire thorax plus head in decapods.

Chela--Pincer formed by the dactylus and propodus, as in most decapods.

Chelate--Possessing one or more chelae. Propodus prolonged so that dactyl strikes its distomedial margin.

Cheliped--Leg or pereiopod when chelated. First two pairs in some decapods.

Chromatophore--Pigmented spot.

Claw--Usually the sharp, terminal segment of a leg; in some decapods synonymous with chela.

Cleft--Split, divided as adjective; a groove or furrow as a noun.

Coalesced--Fused.

Compound eye--Composed of many divergent light receptor cells (ommatidia).

Cornea--Pigmented portion of the eye.

Cotype--An additional or associate type specimen from which a species is described.

Coxa--Proximal segment of a thoracic appendage; coxopodite, coxal plate.

Cryptic--Hidden.

Dactylus (dactyl)--Distalmost joint of a pereiopod or gnathopod. Endopod of biramous appendages.

Decurve--To curve or bend downwards.

Dimorphism--Difference in body structure, usually between male and female.

Distal--Furthest away from the animal body.

Dorsal shield--Cephalothoracic shield.

Emarginate--Notched.

Endite--Process borne on an endopodite.

Endopodite--Internal branch (borne on the propodite) of a biramous limb.

Entire--Smooth as opposed to cleft or incised.

Epimeron--A lateral part or piece of the wall of the somites, situated between the tergum and the insertion of the appendages. One of the lateral plates of the first three abdominal segments (metasome) in amphipods; epimeral plate.

Epipodite--Process borne on the coxopodite.

Epistome--Region between the mouth and antennae, or a plate covering it.

Equals (ing)--Descriptive term meaning "same length as."

Excavate--Hollowed out.

Exite--Process borne on the exopodite.

Exopodite--External branch (borne upon the propodite) of a biramous limb.

Fascicle--Bundle. Usually refers to a bundle of setae or spines.

Filiform--Thread-like.

First antennae--Uppermost or innermost pair of antennae; antennules.

Flagellum--Multiarticulate portion of antenna projecting from a peduncle.

Foliaceous--Leaf-like.

Geniculate--Bent abruptly at an angle, like a bent knee.

Gill--In Malacostraca typically modified part of the thoracic appendage (usually the epipodites) used in respiration; branchia. External in amphipods and borne on the inner side of the proximal segments of the thoracic legs; external in isopods and borne on the pleopods, lying flat against the underside of the abdomen. In decapods primitively there are four gills on each side of every thoracic segment, contained in a branchial chamber; usually the number is greatly reduced.

Gonopods--In decapods sexually modified first and second pleopods. Not present in isopods and amphipods.

Gonopore--External opening of the reproductive organs. In the female Malacostraca always a pair on the sixth thoracic segment and in the male on the eighth thoracic segment.

Head--Most anterior of the three body regions, containing cephalic structures and composed of six fused segments; cephalon.

Holotype--The single type specimen from which a species is originally described, either the sole representative (monotype) or a selected one of a series.

Incised--Margin deeply and sharply notched.

Incisor process--Distal process of mandible modified for biting. May have teeth. May be reduced.

Inferior antenna--Second antenna.

Instar--Developmental stage of animal between molts.

Inter-antennal lobe--Lateral projection of head, sometimes bearing the eye, between antenna 1 and antenna 2.

Ischium--Third segment from proximal end of a thoracic segment.

Joint--In appendages may refer to a segment or an articulation; latter is preferred.

Juvenile--Young stage; early instar; sexually immature.

Labrum--Upper lip.

Lacinia mobilus--Inner process of the stipes of the maxilla.

Lamella--Branchial (gill) plate.

Lanceolate--Pointed like a spear.

Mandible--Mouth appendage that bounds the mouth laterally. Very short and modified for grinding or biting. Calcified. Composed of molar and incisor processes and a palp.

Mandibular groove--Groove separating incisor and molar processes of mandible.

Mandibular palp--Small variably articulated process located on mandible, used in sweeping food into the mouth.

Marsupium--Formed of overlapping oostegites; brood pouch.

Maxilla--One of a pair of mouth appendages immediately following mandibles. Two pair in amphipods, decapods. In amphipods maxilla 1 composed of inner and outer lobes and a 2-segmented palp, maxilla 2 simple, composed of inner and outer lobes.

Maxilliped--Posteriormost mouth appendage. Modified anterior thoracic appendages. One pair in isopods and amphipods, three pair in decapods. In amphipods is composed of an inner and outer plate and a 4-segmented palp.

Maxillule--First maxilla in decapods.

Megalopa--Postlarval stage in decapods.

Merus--Fourth segment from proximal end of a thoracic appendage.

Mesohaline--Moderate salinity, between 8 ‰ and full ocean salinity at 30 ‰.

Mesosome--The free segments of the thorax; six or seven in isopods, seven in amphipods (six in Caprellidea).

Metasome--Pleon. Anterior segments of abdomen; first three in isopods and amphipods, first four or five in decapods.

Molar process--A process with a grinding surface on the inner face of the mandible.

Monomial--Uniramous.

Multiarticulate--Composed of many articles.

Obtuse--Blunt, not sharp.

Oligohaline--very low salinity, less than 8 ‰.

Ommatidium--Light receptor cell, many of which make up a single compound eye.

Oostegite--Marsupial plate. In isopods, amphipods, decapods, and other members of the superorder Pericarida, usually four pairs borne on the anterior legs and forming a brood pouch over the eggs.

Ovigerous--Condition of carrying eggs.

Oviparous--Laying eggs externally, although they may be carried in a brood pouch.

Palm--In chelate and subchelate appendages the posterior margin of the propodus against which the dactyl strikes.

Paratype--A specimen, not the holotype, but of the original series on which a species was based.

Peduncle--Base of antenna. Is also the base of any biramous appendage; protopodite. In amphipods the first antennae consist of a peduncle of three segments. The second antennae have a peduncle of 5 segments; however, only the last two are well developed and the first is fused with the head.

Penial hook--Copulatory hook located on the peraeon in amphipod males.

Penultimate--Next to last of a series, such as a joint or segment.

Peraeon--The thoracic segments (pereods) from which the pereiopods extend.

Pereod--Individual thoracic segment comprising the peraeon; also pereonite.

Pereopod--One of the five pair of thoracic appendages, cheliped and walking appendages; also peraeopod, periopod, pereiopod.

Pleod--Segment of the pleon; also pleonite.

Pleon--Anterior segments of the abdomen from which extend the pleopods. See metasome.

Pleonal--Adjective referring to pleon.

Pleopod--One of the paired appendages of the abdomen extending from the pleon and used in swimming or carrying eggs. May be modified for respiration in isopods. Five pairs in isopods, three in amphipods, four or five in decapods.

Pleosome--Pleon.

Pleotelson--Pleon plus the telson in isopods.

Pleuron--Side plate extending ventrally from the tergum of each segment.

Plumose--Feather-like, usually applies to setae.

Pollex--Thumb or fixed finger of chela at distal end of propodus; has been used for dactyl (movable finger).

Polyhaline--High salinity, usually refers to ocean salinity.

Propodus--Sixth segment from proximal end of a thoracic appendage; propodite.

Protopodite--Basal segment of a typical limb consisting of two more or less consolidated segments (coxa, basis) and bearing at its distal extremity an exopodite or endopodite or both.

Proximal--Toward the body.

Pseudorostrum--Lateral plates coming together above and in front of the head. Found in isopods.

Pubescence--An epidermal covering of many short setae, giving a velvety appearance.

Quadrate--Square-shaped.

Ramus--Branch of an appendage.

Reflexed--Bent, turned or directed back.

Reniform--Kidney-shaped.

Rostrum--Pointed projection of the carapace between the antennae.

Rudimentary--Simple, vestigial.

Second antenna--Below or outside of the first antenna.

Segmentation--Division of body into distinct regions or segments. Frequently body segments may be fused, especially in the head.

Serrate--With an irregular border, saw-like.

Sessile--Not stalked.

Seta--Small bristle or hair composed of cuticular material.

Setose--Bearing setae; setaceous.

Setule--A small, fine hair or other fine structure borne on a seta.

Sigmoid--Curved like the letter S.

Simple--Refers to failure of the dactyl to close against the propodus. Also rudimentary, vestigial.

Somite--Body segment.

Spatulate--Spoon-shaped.

Spine--Similar to seta but much larger.

Spiniform--Spine-like; spinous.

Spinulate--Having many spines; spinulose, spinose.

Statocyst--Balancing organ. A pair are located in the telson of some isopods. Antennal statocysts are present in a few species of amphipods. A pair of statocysts is present in nearly all decapods, located in the basal segments of the antennules.

Sternum--Thickened ventral plates covering each thoracic and abdominal segment.

Stipe--Short, stalked portion of the maxilla.

Strong--Well developed.

Styliform--Very thin and pointed. Usually used in referring to rami.

Subchelate--Appendage in which the dactyl articulates distally and closes proximally.

Subequal--Not quite equal.

Telson--Hindmost segment of the body. Not considered part of the abdomen proper. Projects from rear of the urosome.

Tergum--Thickened dorsal plate of a segment.

Thorax--Middle region of body, composed typically of seven free segments in isopods and amphipods, five segments covered by the carapace in decapods. Eight thoracic segments in amphipods and isopods, first segment fused with head; in Caprellidea there are only six free segments.

Thumb--Dactyl in chelate and subchelate appendages.

Truncate--Having the end square or even, as if cut off.

Tubercle--Small, knoblike prominence.

Ultimate--Last of a series; last segment of peduncle in antennae.

Uncinate--Having an uncinus.

Uncinus--A hook-like structure.

Unguiform--Claw-like.

Ungula--Modified dactyl in parasitic isopods, claw or hooked shaped.

Uniarticulate--One article.

Uniramous--An unbranched appendage; monomial.

Uropod--Hindmost pair of appendages on abdomen in isopods, last three pairs of appendages in amphipods; in decapods one pair if not reduced.

Urosome--Last segments of abdomen, from which the uropods extend. One in isopods, three in amphipods and one in decapods; urus.

Urus--Urosome.

Vestigial--Rudimentary, poorly developed, simple.

Weak--Thin, small, poorly developed.

Wrist--Carpus.

Zoea--Early decapod larva between egg and megalops.

For illustrations and descriptions of isopod and amphipod external morphology, the reader should refer to Barnes' Invertebrate Zoology.

Excellent drawings and descriptions of decapods plus a glossary of decapod terms may be found in Austin B. Williams' Marine Decapod Crustaceans of the Carolinas.

Isopods & Tanaidacea

Key to the Isopoda and Tanaidacea in marine waters of Virginia

John McCain and Daniel Gibson

1. First pair of legs cheliform (fig. 1) . . . . . Order Tanaidacea, *Leptochelia rapax*
   First pair of legs not cheliform (fig. 1) . . . . . Order Isopoda (2)

2. (1) Uropods terminal. . . . . Suborder Oniscoidea (23)
   Uropods lateral . . . . . (3)

3. (2) Uropods forming together with the telson a caudal fan. . . . . (4)
   Uropods ventral, inflexed, arching over the pleopods. . . . . .Suborder Valvifera (16)

4. (3) Uropodal exopods lateral and superior, exopod arching over base of telson. Body cylindrical, elongated, length 7 X width. . . . . Suborder Anthuridea, Anthuridae (5)
   Uropods lateral, exopods not arching over base of telson, body not over 5 X width. . . . . Suborder Flabellifera (6)

5. (4) Telson broadest anteriorly, exopods of uropods narrow (fig. 2) . . . . . *Cyathura polita*
   Telson broadest near midpoint, exopods of uropods broad (fig. 2). . . . . .*Cyathura burbancki*

6. (4) Abdomen fused to form 2 segments, the terminal one large and conspicuous . . . . . .Sphaeromidae (7)
   Abdomen having 6 segments . . . . . (11)

7. (6) Uropods uniramous or with rudimentary exopod . . . . . (8)
   Uropods each with 2 flattened branches; all legs simple; animals able to curl themselves like a ball . . . . . (9)

8. (7) Endopod of uropod long and narrow, length 4 X width . . . . . *Ancinus depressus*
   Uropodal endopod wide and flat, length 2 X width . . . . . *Cassidinidea lunifrons*

9. (7) Outer branch of uropod capable of folding under inner branch; both branches similar in shape and projecting outward . . . . . (10)
   Outer branch of uropod not capable of folding under inner branch; branches unlike, only outer one salient. . . . . *Paracerceis caudata*

10. (9) Abdomen with tubercles. . . . . .*Sphaeroma destructor*
Abdomen lacking tubercles . . . . . .*Sphaeroma quadridentatum*

11. (6) Exopod of uropod flattened and comparable to endopod in size, caudal fan normal. . . . . (12)
Exopod of uropod claw-like, much smaller than endopod, uropods diminutive, caudal fan thus abnormal; wood-boring "gribble". . . . *Limnoria tripunctatum*

12. (11) Maxillipeds setose, never with hooks; uropodal endopods laterally emarginate . . . . . .*Cirolana concharum*
Maxillipeds lacking setae, with outward curving hooks . . . . . Cymothoidae (13)

13. (12) Head posteriorly produced in three lobes, a larger median lobe and two small lateral lobes; not at all immersed in first thoracic segment (fig. 3A). . . . . (14)
Head lobed or not lobed posteriorly, but always immersed in first thoracic segment (fig. 3B). . . . . (15)

14. (13) Uropods and terminal segment ciliated; eyes large . . . . . .*Aegathoa oculata*
Uropods and terminal segment not ciliated; eyes small . . . . . *Olencira praegustator*

15. (13) First antennae stout, twice the width of second pair, longer than 2nd pair . . . . . .*Irona nana*
First antennae not stout, equal to or shorter than 2nd pair . . . . . *Lironeca ovalis*

16. (3) First three pairs of legs with the sixth article (propodus) dilated and forming, with the reflexible dactylus, a subchelate hand (fig. 1) . . . . . (17)
Legs nearly all alike, with the 6th article or propodus not expanded or but little expanded; 7th article prehensile . . . . . (19)

17. (16) Antennal pairs approximately equal in length . . . . . .*Chiridotea coeca*
Antenna two approximately twice the length of antenna one. . . . . (18)

18. (17) Dactyl of 1st pereiopod smooth (fig. 4) . . . . . *Chiridotea almyra*
Dactyl of 1st pereiopod spinulose (fig. 4) . . . . . *Chiridotea tuftsi*

19. (16) Flagellum of second pair of antennae well developed and multi-articulate. . . . . (20)
Flagellum of second pair of antennae not multi-articulate . . . . . (21)

20. (19) Telson doubly notched (fig. 5). . . . . .Idotea baltica
Telson truncated (fig. 5) . . . . . .Idotea metallica

21. (19) Second pair of antennae shorter than first pair . . . . . .Edotea triloba
Second pair of antennae much longer than first pair. . . . . (22)

22. (21) Surface of body smooth throughout . . .Erichsonella attenuata
Surface of body tuberculated. . . . . Erichsonella filiformis

23. (2) Uropods extremely long, equal biramous, with lengthened protopod (intertidal form). Ligiidae . . . . . Ligia exotica
Exopod of uropod much larger than inner branch (terrestrial form, found on beaches, under debris, on rocks and pilings). . . . . Porcellio levis

Isopod References

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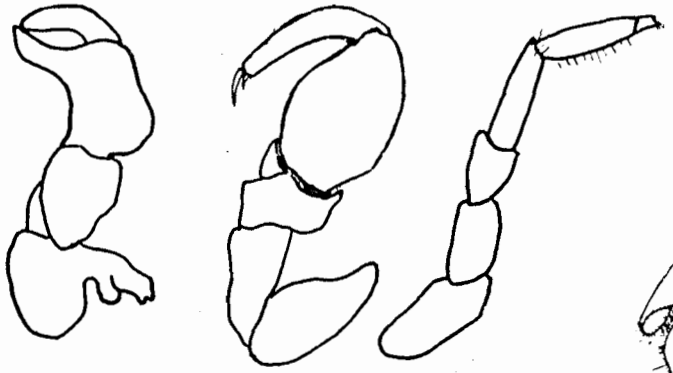
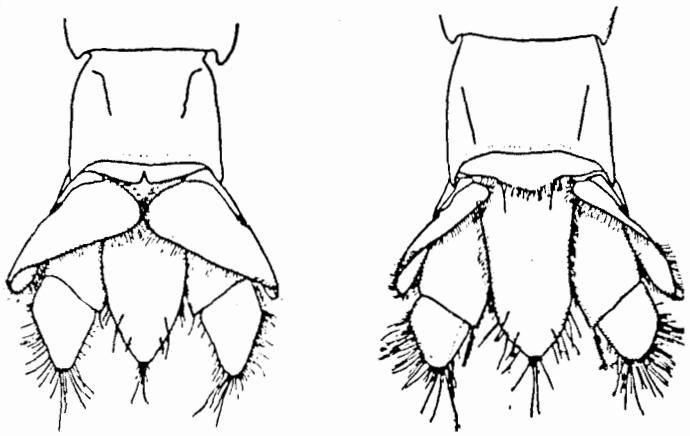


SUBCHELATE

CHELIFORM SIMPLE

FIG. 1



C. BURBANCKI C. POLITA

(FROM FRANKENBERG)

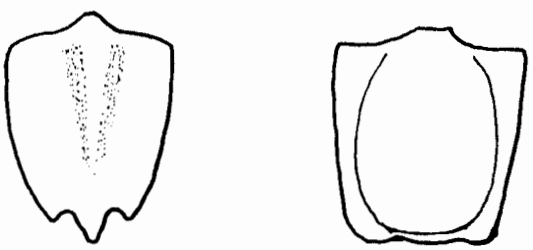
FIG. 2

AEGATHOA IRONA LIRONECA

FIG. 3

C. TUFTSI C. ALMYRA

FIG. 4



I. BALTICA I. METALLICA

FIG. 5

Amphipods

Key to the Amphipods of Virginia Marine Waters

John McCain and James Feeley

Key to the Families

1. Six free thoracic segments, abdomen greatly reduced. Suborder Caprellidea . . . . . Caprellidae
   Seven free thoracic segments, abdomen not reduced. . . . . (2)

2. (1) Head and eyes large and swollen. Suborder Hyperiidea. . . . . Hyperiidae
   Head and eyes not swollen. Sub-order Gammaridea . . . . . (3)

3. (2) Eyes four, each with a simple lens. . . . . .Ampeliscidae
   Eyes two, compound, may be rudimentary, absent, or, in one case, united. . . . . (4)

4. (3) Abdomen flattened dorso-ventrally . . . . . Corophiidae
   Abdomen not flattened dorso-ventrally. . . . . (5)

5. (4) Terminal uropods uniramous. . . . . (6)
   Terminal uropods biramous, inner ramus may be minute. . . . . (8)

6. (5) First and second antennae nearly equal, coxal plates greatly enlarged. . . . . .Stenothoidae
   First antenna shorter than second antenna; coxal plates not enlarged . . . . . (7)

7. (6) First antenna longer than peduncle of second; ventral side of antenna 2 very setose. Reported from Ocean City, Maryland . . . . . Hyalidae, <u>Allorchestes littoralis</u>
   First antenna shorter than peduncle of second; ventral side of antenna 2 not very setose. . . . . .Talitridae

8. (5) Terminal uropods with short rami, not equal to peduncle, the outer uncinate . . . . . (9)
   Terminal uropods not uncinate, at least one ramus equal or longer than peduncle . . . . . (10)

9. (8) Inter-antennal lobes small; outer lobes of lower lip notched; antenna 1 longer than antenna 2. . . . . Ampithoidae
Inter-antennal lobes prominent; outer lobes of lower lip entire; antenna 1 shorter than antenna 2. . . . . Ischyroceridae, Jassa falcata

10. (8) Accessory flagellum present, may be of only one minute article . . . . . (11)
Accessory flagellum not present . . . . . (14)

11. (10) Either pair of gnathopods well developed . . . . . (12)
Gnathopods poorly developed . . . . . (17)

12. (11) Gnathopods equal or second larger than first . . . . . (13)
Gnathopods not equal, first larger than second. . . . . (19)

13. (12) Mandible with poorly developed molar, first article of mandibular palp elongated; palp geniculate between articles one and two. Antennae short, about 1/5 body length . . . . . .Liljeborgiidae
Not with this combination of characters. At least one pair antennae much longer than 1/5 body length. . . . . .Gammaridae

14. First four gill pairs simple flat lamellae (gills located on inner base of peraeopods). . . . . (15)
First four gill pairs feather-like (rare) . . . . . .Atylidae, Atylus minikoi

15. (10) Antenna 1 shorter than antenna 2; eyes continuous above to form a diamond-shaped eye; eye sometimes bleached but ommatidia visible . . . . . Oedicerotidae, Monoculodes edwardsi
Eyes not united . . . . . (16)

16. (14) First antenna longer than second. Flagella long and fine, peduncles short. Eyes large . . . . . .Pleustidae, Sympleustes glaber
First antenna not as long as second; eyes very large. . . . Bateidae, Batea catharinensis

17. (11) Rostrum expanded into a hood over the antennae . . . . . Phoxocephalidae
Rostrum not expanded into a hood over the antennae. . . . . (18)

18. (16) Appendages abundantly setose. . . . . .Haustoriidae
Appendages sparsely setose. . . . . Lysianassidae

19. (12) Second gnathopod subchelate . . . . . .Aoridae, Lembos smithi
Second gnathopod simple . . . . . .Photidae

Key to Species

Arranged by Families

Ampeliscidae

1. Terminal uropods extending but little beyond the others; telson short and broad, not deeply cleft. Eyes not pigmented. . . . . .Byblis serrata
Terminal uropods extending well beyond others; telson oblong, deeply cleft. Eyes red in fresh specimens. . . . . (2)

2. Antenna 1 in female usually shorter than peduncle of antenna 2 . . . . . (3)
Antenna 1 in female exceeding peduncle of antenna 2 by one-half. . . . . (4)

3. Head about as long as first three segments of thorax, posterolateral angle of third abdominal pleuron with acute, slightly upturned projection . . . . .Ampelisca macrocephala
Head markedly shorter than first three segments of thorax, posterolateral angle of third abdominal pleuron broadly rounded. . . . . Ampelisca compressa

4. Posterodorsal angle of segment 3 of urosome sharply upturned; lateral margin of outer ramus of uropod 2 with 3-5 spines. . . . . Ampelisca vadorum
Posterodorsal corners of urosome segment 3 rounded; uropod 2 with 1-2 spines on margin of outer ramus. . . . . .Ampelisca abdita

/A. vadorum and A. abdita are extremely hard to distinguish morphologically; for further distinctions, see Mills (1964)./

Ampithoidae

1. Accessory flagellum a single minute article. . . . . Cymadusa compta
   Accessory flagellum absent. . . . . .Ampithoe longimana

Aoridae

One species characterized by antenna 1 much longer than antenna 2 . . . . . Lembos smithi

Atylidae

One species, from Eastern Shore . . . . . .Atylus minikoi

Caprellidae

1. Median spine present between bases of second pereiopods. . . . . .Caprella equilibra
   Ventral spine absent. . . . . (2)

2. Cephalon bearing one or more anteriorly directed median spines . . . . . (3)
   Cephalon lacking spines . . . . . (4)

3. Cephalon bearing two acute spines . . . . . .Deutella incerta
   Cephalon bearing only one median spine. . . . . Caprella geometrica

4. Gnathopod 2 doubly notched. . . . . .Hemiagena minuta
   Gnathopod 2 singly notched, two brown bands on ischium . . . . . Paracaprella tenuis

Corophiidae

1. Accessory flagellum present; terminal uropods very small and "biramous". White with pink patterning . . . . . .Unciola irrorata
   Accessory flagellum absent. . . . . (2)

2. Second antenna conspicuously larger than first . . . . . (3)
   Second antenna not conspicuously larger than first. . . . . (8)

3. Uropods one and two attached ventrally and lateral margins of urosome without notches. Urosome with raised lateral margin forming a ridge . . . . . (4)
   Uropods one and two inserted in notches in lateral margins of urosome. Urosome without raised lateral margins . . . . . (5)

4. Entire urosome and uropods covered with a fine, velvety pubescence (a rare species; probably meso- to polyhaline). . . . . .Corophium simile
Urosome and uropods not covered by a pubescence (more common; probably oligohaline) . . . . . .Corophium lacustre

5. Antenna 2, segment 4 with a large terminal tooth and a smaller one above (males). . . . . (6)
Antenna 2, segment 4 armed only with spines (females) . . . . . (7)

6. Antenna 2, segment 4 quite setose. Rostrum obtusely triangular. . . . .Corophium tuberculatum ♂
Antenna 2, segment 4 with few, short setae. Rostrum minute . . . . Corophium acherusicum ♂

7. Antenna 2, segment 5 without spines . . . . . .Corophium tuberculatum ♀
Antenna 2, segment 5 with one or two spines. . . . . Corophium acherusicum ♀

8. First segment of antenna 1 greatly enlarged; found in tube which it carries along; uropods 2 and 3 uniramous. . . . . Cerapus tubularis
First segment of antenna 1 not greatly enlarged; chela of male greatly enlarged; only rudimentary uropod 3 uniramous. Antennae equal, more or less. Often with red eyes . . . . . .Ericthonius brasiliensis

Gammaridae

1. Antenna 2 scarcely longer than peduncle of first; terminal uropods projecting little beyond the others. .Elasmopus pocillimanus
Antenna 2 much longer than peduncle of first; terminal uropod flattened, projecting well beyond the others. . . . . (2)

2. (1) Eyes reniform; inner ramus of terminal uropod distinct. . . . . (3)
Eyes oval; inner ramus of terminal uropod minute. . . . . (7)

3. (2) Antennal peduncular segments relatively weakly setose; posterior border of the basal expansion of peraeopod 5 weakly setose (habitat meso- to polyhaline) . . . . . (4)
Antennal peduncular segments strongly setose; basal expansion of peraeopod 5 strongly setose (habitat oligo- to mesohaline). . . . . (5)

4. (3) First three abdominal segments with a conspicuous dorsomedial spine projecting backward to form a sharply acute tooth (sometimes missing in young specimens or those from outer coast localities); dorsal surface of urosome with very distinct clusters of spines; terminal uropods long, not densely setose . . . . . Gammarus mucronatus

First three abdominal segments without a medial spine; dorsal surface of urosome with very weak clusters of spines; terminal uropod short, densely setose . . . . . Gammarus species #1

5. (3) Antenna 1, ventral margin of peduncular segment 2 with one prominent group of setae and one or two small accessory setae; antenna 2 and peraeopods in male without fine, curled setae; urosome segments somewhat dorsally "humped" . . . . . .Gammarus fasciatus

Antenna 1, peduncular segment 2 with 2-5 equally strong median ventral groups of setae; antenna 2 and peraeopods in male with numerous fine curled setae; urosome segments not humped. . . . . (6)

6. (5) Basal flagellar setae of antenna 1 one to two times width of articles; antenna 1, peduncular segment 2 with 4-5 median ventral groups of long setae increasing distally in size; peduncle of antenna 2 with numerous groups of long stiff setae often equal in length to segment; first coxal plate with notch at the posteroventral corner; coxal plate 1 broadest distally; dorsolateral clusters of spines on urosome segment small and close to mid-dorsal group, occasionally lacking. . . . . Gammarus species #2

Basal flagellar setae of antenna 1 less than width of articles; antenna 1, peduncular segment 2 with 2-4 median ventral groups of short setae not increasing distally in size; peduncle of antenna 2 with relatively few stiff setae and never as long as segment; first coxal plate without a posteroventral notch; coxal plate 1 equal in width; dorsolateral cluster of spines on urosome segment 1 large and remote from mid-dorsal group . . . . . Gammarus tigrinus

7. (2) Left or right gnathopod 2 of male greatly enlarged; posterior borders of abdominal segments forming spines . . . . . .*Melita fresnelii*
One gnathopod 2 of male not greatly enlarged; posterior borders of abdominal segments smooth. . . . . *Melita nitida*

Haustoriidae

1. Rostrum not present, eyes easily seen . . . . . *Amphiporea virginiana*
Rostrum present; eyes not conspicuous. . . . . (2)

2. Rostrum long. . . . . .*Haustorius canadensis* - subspecies
Rostrum short . . . . . (3)

3. Rostrum short, acute. Rare, Eastern Shore. . . . . *Lepidactylus dytiscus*
Rostrum blunt, stout. . . . . (4)

4. Posterodorsal border of pleon segment 3 free or slightly decurved, not reflexed; urosome and uropod 1 strong, rami spinose; pleon side plate 3 rounded. . . . . *Protohaustorius wigleyi*
Posterodorsal border of pleon segment 3 strongly reflexed forming a lobe overhanging urosome; urosome short; uropod 1 slender, inner ramus with spines and setae; pleon side plate 3 with posterior spinous process. . . . . .*Acanthohaustorius millsi*

Hyperiidae

1. Posterior two thoracic segments and first two abdominal segments with a median spine projecting posteriorly. . . . . *Parathemisto gaudichaudii*
Posterior two thoracic segments and first two abdominal segments lacking median spine . . . . . (2)

2. Sides of pereiopods abundantly setose . . . . . *Hyperoche medusarum*
Sides of pereiopods with few, if any, setae. . . . . *Hyperia galba*

Ischyroceridae

One species characterized by propodus of second gnathopod enormously developed into a long narrow thumb-like process. Minute accessory flagellum of one segment. Antenna 1 shorter than second. . . . *Jassa falcata*

Liljeborgiidae

Propodus of gnathopod 2 with large square projection near attachment of dactyl; dactyl of peraeopod 5 short, somewhat conical. . . . . .*Listriella clymenellae*

Propodus of gnathopod 2 smooth near attachment of dactyl; dactyl of peraeopod 5 slender elongate . . . . . *Listriella barnardi*

Lysianassidae

Third uropod extending backward farther than first uropod; telson cleft. . . . . *Hippomedon serratus*

Third uropod not extending backward farther than first; telson entire . . . . . *Lysianopis alba*

Photidae

Antenna 1 longer than antenna 2. Oceanic . . . . . .*Leptocheirus pinguis*

Antenna 1 shorter than antenna 2. Meso- to oligohaline . . . . . *Leptocheirus plumulosus*

Phoxocephalidae

Inner ramus of third uropod equal in length to outer ramus . . . . . *Paraphoxus spinosus*

Inner ramus of third uropod less than one-half length of outer ramus. . . . . .*Phoxocephalus holbolli*

Stenothoidae

1. Fourth pair of coxal plates greatly enlarged, covering the other coxal plates and thoracic legs . . . . . .*Parametopella cypris*

   Fourth pair of coxal plates not greatly enlarged and covering the other coxal plates and thoracic legs . . . . . (2)

2. (1) Ventral surface of both pairs of antennae with many very long setae. . . . . Stenothoe gallensis
Antennae with very short setae (equaling width of articles) . . . . . .Stenothoe minuta

Talitridae

1. Eye width approximately one-half width of head segment; first gnathopod in females simple. . . . . (2)
Eye width approximately one-third width of head segment; first gnathopod in both sexes subchelate . . . . . (3)

2. Second antennae in male subequal to body; second abdominal segment with posterolateral corners rectangular or slightly acute; usually estuarine. . . . . .Talorchestia longicornis
Second antennae in male conspicuously less than body length; postero-lateral angle of second abdominal segment with small acute rectangular process; usually along outer coasts . . . . . Talorchestia megalophthalma

3. Outer ramus of uropod 1 smooth. . . . . Orchestia platensis
Outer ramus of uropod 1 with spines . . . . . (4)

4. Dactyl of gnathopod 2 of male equals propodus . . . . . .Orchestia uhleri
Dactyl of gnathopod 2 of male much shorter than propodus. . . . . Orchestia grillus

APPENDIX

The following key is intended to be used only as a means for quickly separating gammarid amphipods present in the lower Chesapeake Bay and its adjacent waters by persons not expert in amphipod taxonomy. It should not be construed as a definitive taxonomic description of these species and their families. External structures referred to in the key are shown in Figure 8.

KEY TO THE SUBORDER GAMMARIDAE OF THE LOWER CHESAPEAKE BAY

Key to the Families

1. Eyes four, each with a simple lens . . . . . Ampeliscidae
   Eyes two, compound, may be rudimentary, absent, or, in one case, united . . . . . (3)

2. Abdomen flattened dorso-ventrally. . . . . Corophiidae
   Abdomen not flattened dorso-ventrally . . . . . (3)

3. Terminal uropods uniramous . . . . . (4)
   Terminal uropods biramous, inner ramus may be minute . . . . . (5)

4. First and second antennae nearly equal; coxal plates greatly enlarged . . . . . Stenothoidae
   First antenna shorter than peduncle of second antenna; coxal plates not enlarged . . . . . Talitridae

5. Terminal uropods with short rami not equaling peduncle, the outer uncinate. . . . . (6)
   Terminal uropods with at least one ramus equal to or longer than peduncle, uncini lacking. . . . . (7)

6. Inter-antennal lobes small; outer lobes of lower lip notched; antenna 1 longer than antenna 2 . . . . . Ampithoidae
   Inter-antennal lobes prominent; outer lobes of lower lip entire; antenna 1 shorter than antenna 2 Ischyroceridae. . . . . Jassa falcata

7. Accessory flagellum present, may be of only one minute article. . . . . (8)
   Accessory flagellum lacking. . (11)

8. Either pair of gnathopods well developed . . . . . (9)
Gnathopods poorly developed. . . . . (14)

9. Antenna 1 short, 1/5 body length . . . .Liljeborgiidae
Antenna 1 greater than 1/5 body length. . . . . (10)

10. Gnathopods equal or second larger than first. . . . . .Gammaridae
Gnathopods not equal, first larger than second . . . . . Aoridae

11. Eyes united forming one diamond-shaped eye; eye sometimes bleached in preserved specimens but ommatidia visible. Oedicerotidae . . .Monoculodes edwardsi
Eyes not united. . . . . (12)

12. Antenna 1 shorter than antenna 2; eyes very large; telson cleft. Bateidae. . . . . Batea catharinensis
Antenna 1 longer than antenna 2; eyes distinct; telson entire. . . . . (13)

13. Flagella of antennae uniarticulate and much shorter than peduncles; adult less than 2 mm long. Colomastigidae. . . . . .Colomastix sp.
Flagella of antennae multiarticulate and exceeding peduncles; adult about 6 mm long . . . . . .Pleustidae

14. Rostrum expanded into hood over the antennae. Phoxocephalidae. . . . . .Paraphoxus epistomus
Rostrum not expanded into hood over the antennae. . . . . (15)

15. Appendages abundantly setose; telson cleft . . . . . .Haustoriidae
Appendages sparsely setose; telson entire. Lysianassidae. . . . . Lysianassa alba

Key to Species Arranged by Families

Ampeliscidae

1. Antenna 1 in female usually shorter than peduncle of antenna 2; head about as long as first three segments of thorax . . . . . .Ampelisca verrilli
Antenna 1 in female exceeding peduncle of antenna 2 by one-half; head mardedly shorter than first three segments of thorax. . . . . (2)

2. Posterodorsal angle of segment 3 of urosome sharply upturned; lateral margin of outer ramus of uropod 2 with 3-5 spines. . . . . Ampelisca vadorum
Posterodorsal corners of urosome segment 3 rounded; uropod 2 with 1-2 spines on margin of outer ramus . . . .Ampelisca abdita

Ampithoidae

1. Accessory flagellum a single minute article; gnathopods with plumose setae. . . . . Cymadusa compta
Accessory flagellum absent; gnathopods lacking plumose setae . . . . . (2)

2. Antenna 1 as long as body; gnathopod 2 propodus nearly twice as long as wide, palm oblique . . . . . .Ampithoe longimana
Antenna 1 half as long as bidy; gnathopod 2 massive, nearly as wide as long, palm oblique . . . . . Ampithoe valida

Aoridae

1. Gnathopods subchelate in one or both pairs. . . . . (2)
Gnathopods scarcely subchelate . . . . . Rudilemboides sp.

2. Gnathopods subchelate in male and in gnathopod 1 of female. . . . . Lembos smithi
Gnathopod 2 simple . . . . . Leptocheirus plumulosus

Corophiidae

1. Accessory flagellum present; body white with pind patterning . . . . .Unciola irrorata
Accessory flagellum absent; body darkly patterned. . . . . (2)

2. Second antenna conspicuously larger than first. . . . . (3)
Second antenna not conspicuously larger than first . . . . . (7)

3. Uropods one and two attached ventrally; urosome with raised lateral margins forming a ridge and lacking notches . . . . . (4)
Uropods one and two inserted in notches in lateral margins of urosome; latter lacking raised margins . . . . . (5)

4. Antenna 2, segment 4, with setose dorsal surface, and in both sexes possessing two unequally large, anteriorly directed, distal teeth; entire urosome covered with a velvety pubescence; polyhaline species. . . . Corophium simile

Antenna 2, segment 4, with sparsely setose dorsal surface, and only male possesses two distal teeth; female bearing one weak tooth on antenna 2, segment 4; urosome not covered by a pubescence; very common oligohaline species . . . . . .Corophium lacustre

5. Antenna 2, segment 4 with a large terminal tooth and a smaller one above (males) . . . . . (6)

Antenna 2, segment 4 armed only with spines (female). . . . . (7)

6. Antenna 2, segment 4 quite setose; rostrum obtusely rectangular. . (male). . . . . .Corophium tuberculatum

Antenna 2, segment 4 with few short setae; rostrum minute. (male). . . . . Corophium acherusicum

7. Antenna 2, segment 5 without spines (female) . . . . . .Corophium tuberculatum

Antenna 2, segment 5 with one or two spines. (female) . . . . . Corophium acherusicum

8. First segment of antenna 1 greatly enlarged; carried tube which it constructs; uropods 2 and 3 uniramous; eyes dull . . . . . Cerapus tubularis

First segment of antenna 1 not greatly enlarged; only rudimentary uropod 3 uniramous; eyes often red . . . . . .Ericthonius brasiliensis

Gammaridae

1. Antenna 2 scarcely longer than peduncle of first; terminal uropods projecting little beyond the others. . . . . Elasmopus levis

Antenna 2 much longer than peduncle of first; terminal uropods flattened, projecting well beyond the others. . . . . (2)

2. Eyes oval; inner ramus of terminal uropods minute. . . . . (3)

Eyes reniform; inner ramus of terminal uropods distinct . . . . . (4)

3. Left or right gnathopod 2 of male greatly enlarged; posterior borders of abdominal segments forming spines. . . . . .*Melita appendiculata*

Neither second gnathopod of male larger than other; posterior borders of abdominal segments smooth. . . . . *Melita nitida*

4. Pleon segments with a conspicuous dorsomedial spine projecting backward to form a sharply acute tooth (sometimes missing in young specimens); antennal peduncular segments weakly setose . . . . . *Gammarus mucronatus*

Pleon segments without a medial spine; antennal peduncular segments strongly setose . . . . . (5)

5. Coxal plate 1 with several very short setae lining anteroventral margin, urosome segments dorsally flattened, with short dorsomedial spines. . . . . .*Gammarus palustris*

Coxal plate 1 with several (5-8) long setae at anteroventral angle; urosome segments dorsally raised, with distinct dorsomedial spines. . . . . (6)

6. Urosome segments with distinct dorsal "hump"; antenna 1, peduncular segment 2 with only one major cluster of posterior marginal setae; antenna 2 bearing straight setae in males and females; freshwater. .*Gammarus fasciatus*

Urosome segments with only small dorsal elevation; antenna 1, peduncular segment 2 with 3-5 groups of posterior marginal setae; antenna 2 and peraeopods with curly setae in male; oligohaline to mesohaline. . . . . (7)

7. Antenna 1, basal flagellar segments with alternate posterior setae longer than twice the width of respective segments; antenna 2, peduncular segments 4, 5 with 5-6 setae per cluster; most abundant oligohaline Gammarus in lower Chesapeake tributaries. . . . . .*Gammarus daiberi*

Antenna 1, basal flagellar segments with alternate posterior setae short, scarcely exceeding width of segment; antenna 2, peduncular segments 4, 5 with about 3 setae per cluster; predominantly mesohaline . . . . . *Gammarus tigrinus*

Haustoriidae

1. Body slender, peraeon segments lacking lateral lobes, rostrum lacking, eyes easily seen . . . . . *Bathyporeia* sp.
   Body broad, peraeon segments laterally lobate, rostrum distinct, eyes not evident . . . . . (2)

2. Rostrum elongate . . . . . *Haustorius* sp.
   Rostrum short, triangulate . . . . . (3)

3. Rostrum shorter than anterolateral angles. . . . . (4)
   Rostrum exceeding anterolateral angles. . . . . (5)

4. Peraeopod 3, segment 5 narrow, posterodistal margin with 2 spines, uropod 2 uniramous. . . . . *Neohaustorius schmitzi*
   Peraeopod segment 5 broad distally, posterodistal margin with 8 spines, uropod uniramous. . . . . *Lepidactylus dytiscus*

5. Pleosome 3 with posterodorsal suboonic process, side plate with weak spine; peraeopod 5, coxal plate posteriorly quadrate. . . . . Acanthohaustorius intermedius
   Pleosome 3, posterdistal margin normally rounded behind, side plate with large spine; peraeopod 5, coxal plate posteriorly acute. *Acanthohaustorius millsi*

Liljeborgiidae

1. Antenna 1 shorter than peduncle of antenna 2; gnathopod 1 larger than gnathopod 2. . . . . *Idunella* sp.
   Both antennae short and subequal to each other; gnathopod 2 larger than gnathopod 1 . . . . . (2)

2. Propodus of gnathopod 2 with large square projection near attachment of dactyl; dactyl of peraeopod 5 short, subconical . . . . . *Listriella clymenellae*
   Propodus of gnathopod 2 smooth near attahcment of dactyl; dactyl of peraeopod 5 slender, elongate. . . . . *Listriella barnardi*

Pleustidae

Mandible possessing ridged molar tubercle; common. . . . . .Sympleustes glaber
Mandible lacking molar tubercle; very rare . . . . . .Parapleustes sp.

Stenothoidae

1. Pereopods 4 and 5: article 2 linear; fourth pair of coxal plates greatly enlarged . . . . . .Parametopella cypris
   Pereopods 4 and 5: article 2 expanded; fourth pair of coxal plates not greatly enlarged . . . . . (2)

2. Palm of gnathopod 2 in male only 1/2 length of propodus; latter convex ventrally. . . . . .Stenothoe minuta
   Palm of gnathopod 2 in male extending full length of propodus; latter concave ventrally. . . . . Stenothoe gallensis

Talitridae

1. Female gnathopod 1 simple. . . . . (2)
   Female gnathopod 1 subchelate. . . . . (3)

2. Eye covering about 1/10 of side of head, antenna length 1/3 of body in female, equal to body in male; male gnathopod 2 propodus nearly twice as long as deep. . . . . .Talorchestia longicornis
   Eye covering about 1/2 of side of head; antennae much shorter than in longimanus; male gnathopod 2 propodus nearly as deep as long . . . . . T. megalophthalma

3. Propodus of male gnathopod 1 with dactyl reaching only to base of distal rounded lobe . . . . . .Orchestia uhleri
   Dactyl reaching extremity of distal lobe of propodus. . . . . (4)

4. Outer ramus of uropod 1 smooth except for terminal spines. . . . . .O. platensis
   Outer ramus of uropod 1 with lateral spines. . . . . .O. grillus

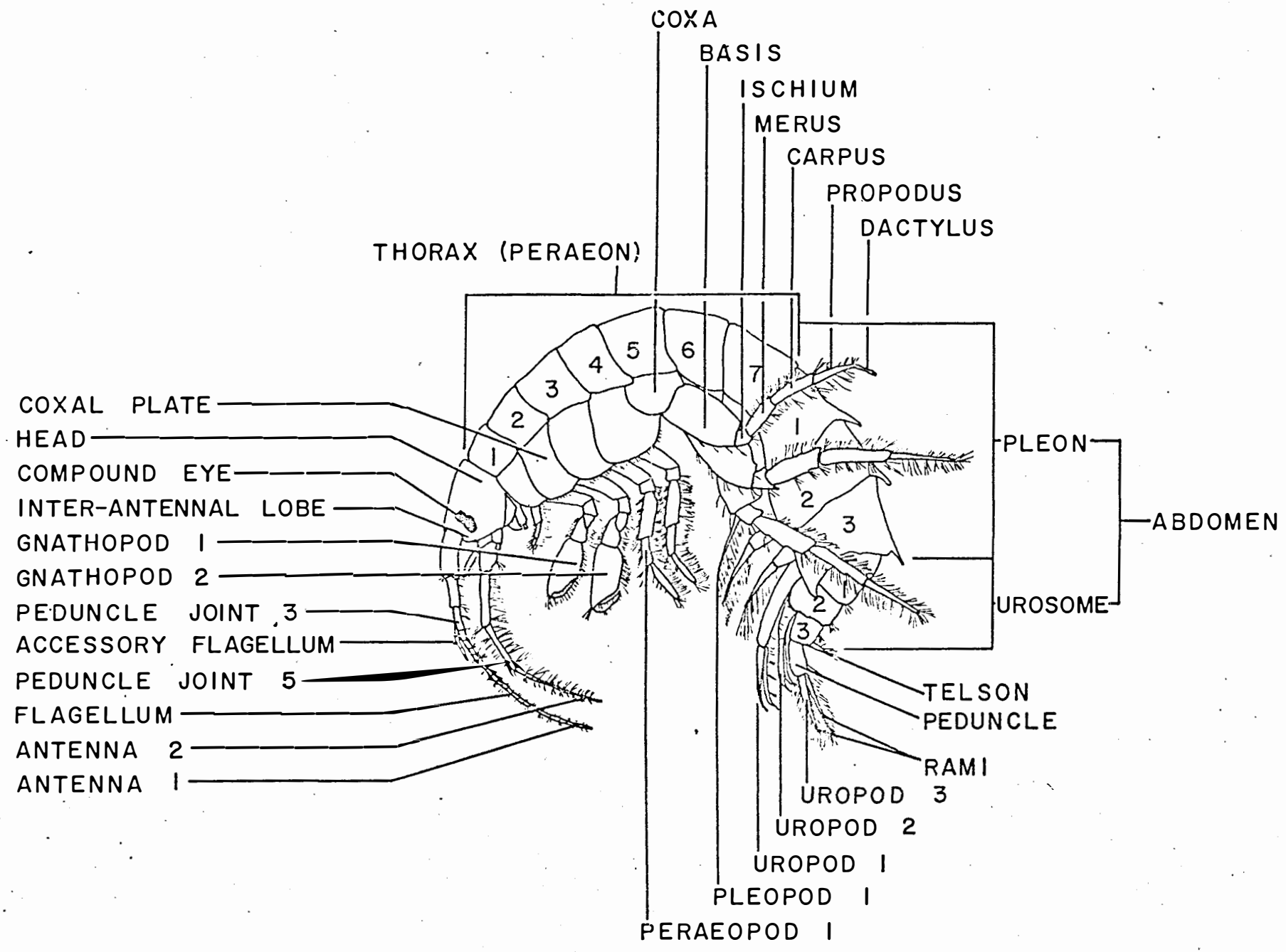


Figure 8. Gammarus mucronatus (after Kunkel, 1918).

Decapod Crustaceans

Key to Decapod Crustaceans of the Chesapeake Bay Area

Marvin L. Wass and James M. Curtis

1. General form shrimp-like (Suborder Natantia, true shrimps and prawns). . . . . (2)
   General form crab-like or lobster-like (Suborder Reptantia). . . . . (17)

2. (1) Pleura of 2nd segment of abdomen overlapping the first segment (Fig. I). . . . . (8)
   Pleura of 2nd segment of abdomen not overlapping the first segment . . . . . (3)

3. (2) First 3 pairs of legs chelate (Fig. II); all legs well developed (Penaeidae) . . . . . (4)
   None of the legs chelate; last 2 pairs small or wanting; 3rd maxilliped long, pediform (may be confused with legs) (Sergestidae) . . . . . (7)

4. (3) Rostrum with ventral teeth . . . . . (5)
   Rostrum without ventral teeth. . . . .*Trachypeneus constrictus*

5. (4) Lateral rostral grooves not extending beyond base of rostrum; flagellum of 2nd antenna twice length of body. . . . . *Penaeus setiferus*
   Lateral rostral grooves reaching almost to posterior margin of carapace; flagellum of 2nd antenna less than twice body length . . . . . (6)

6. (5) Petasma of male with external edge of distoventral lobe armed with 2 to 12, usually 4 to 7, spinules; teeth of internal edge of lobe long and sharp in close-set group of 6 to 16. Thelycum of female with anteromedian corners of lateral plates moderately gaping, not covering carina of posteromedian part of median plate on 13th body somite (4th legs) . . . . . *P. duorarum*
   Petasma of male with external edge of distoventral lobe smooth, incurved, teeth of internal edge of lobe small, in close-set group. Thelycum of female with anteromedian corners of lateral plates widely gaping, exposing forked carina of posteromedian plate on 13th body somite (4th legs) . . . . . .*P. aztecus*

7. (3) Head not greatly elongated; gills present . . . . . Acetes americanus carolinae
Head greatly elongated; gills absent . . . . . .Lucifer taxoni

8. (2) Carpus of 2nd pair of legs annulated (Fig. I). . . . . (13)
Carpus of 2nd pair of legs not annulated . . . . . (9)

9. (8) Rostrum short, not compressed; 1st pair of legs subchelate (Fig. II); 2nd pair of legs minutely chelate, almost filiform; eyes set close together (Crangonidae). . . . . .Crangon septemspinosus
Rostrum long and laterally compressed; 1st and 2nd pairs of legs chelate; eyes widely spaced (Palaemonidae) . . . . . (10)

10. (9) Fused part of the two rami of upper antennular flagellum distinctly longer than the free part (Fig. III). .Palaemonetes paludosus
Fused part of the two rami of upper antennular flagellum shorter than or as long as the free part . . . . . (11)

11. (10) Carpus of 2nd leg in adult female shorter than palm, in males only very slightly (1.1 times) longer or shorter than palm; dactylus of 2nd leg with 2 teeth on cutting edge, immovable finger with only one. Rostrum with first 2 teeth of dorsal margin behind orbit; dorsal rostral teeth reaching up to apex. . . . . P. vulgaris
Carpus of 2nd leg in adult female much longer than palm (1.3 to 1.5 times), in males carpus almost as long as chela; dactylus of 2nd leg with one or no teeth, fixed finger without teeth or cutting edge; rostrum with only one dorsal tooth behind orbit. . . . . (12)

12. (11) Dorsal teeth of rostrum reaching up to apex, which is often bifid; lower margin with 4 or 5, seldom 3, teeth; dactylus of 2nd leg with one distinct tooth on cutting edge, cutting edge of fixed finger entire . . . . . .P. intermedius
Dorsal margin of rostrum with an armed portion before tip; tip thereby dagger-shaped; lower margin of rostrum with 2 to 4, generally 3, teeth; dactylus as well as fixed finger of 2nd leg without teeth on cutting edge . . . . . .P. pugio

13. (8) Eyes covered by the carapace (Alpheidae) . . . . . (14)
Eyes not covered by the carapace . . . . . (15)

14. (13) Orbital lobes forming tooth-like projection; propodus of major chela notched on outer margin (Fig. V). . . . . .Alpheus normanni
Orbital lobes rounded; propodus of major chela notched on both margins (Fig. IV) . . . . . .A. heterochaelis

15. (13) Rostrum small or wanting; eyestalks long (Ogyrididae) . . . . . Ogyrides limicola
Rostrum well developed, exceeding eyestalks (Hippolytidae). . . . . (16)

16. (15) Basal article of antennular peduncles without distal spines dorsally. . . . .Hippolyte pleuracantha
Basal article of antennular peduncles with distal spines dorsally . . . . . .H. zostericola

17. (1) Carapace not fused with epistome (Fig. VI); antennae inserted lateral to eyes; uropods present but often greatly modified. . . . . (18)
Carapace fused with epistome, at least at sides; antennae inserted mediad to eyes; uropods absent. . . . . (25)

18. (17) Lobster-like (Callianassidae). . . . . (19)
Crab-like. . . . . (20)

19. (18) Rostrum small; first 2 pairs of pleopods different from following 3 pairs; chelipeds dissimilar and unequal; uropodal endopods not much longer than broad . . . . . Callianassa atlantica
Rostrum large; 2nd pair of pleopods like following 3 pairs; chelipeds alike and subsequel . . . . . .Upogebia affinis

20. (18) Abdomen swollen, membranous and asymmetrical (Paguridae). . . . . (21)
Abdomen reduced, calcareous and symmetrical . . . . . (23)

21. (20) Length of eyestalk not more than 3.5 times its greatest width. . . . . (22)
Length of eyestalk at least 4 times its greatest width. . . . . Pagurus annulipes

22. (21) Width of major chela less than ½ length. . . . . .P. longicarpus
Major chela broad and flattened, width more than ½ length. . . . . P. pollicaris

23. (20) Legs 2 through 4 normal; tail fan well developed and adapted for swimming (Porcellanidae) . . . . . (24)
Legs 2 through 4 with last joint curved and flattened; tail fan not adapted for swimming (Hippidae) . . . . . .Emerita talpoida

24. (23) Chelipeds long, unequal and distorted; carapace slightly wider than long (Fig. VIII) . . . . . .Polyonyx gibbesi
Chelipeds short; carapace subcylindrical, much longer than broad (Fig. IX). . . . .Euceramus praelongus

25. (17) Body narrowed in front (Figs. X, XI); rostrum usually distinct orbits usually incomplete (Inachidae). . . . . (26)
Body of medium width or broad in front; rostrum reduced or wanting; orbits well formed . . . . . (27)

26. (25) Carapace with 6 median spines; tubercles few (Fig. X). . . . . Libinia dubia
Carapace with 9 median spines; tubercles numerous, unevenly placed (Fig. XI). . . . . L. emarginata

27. (25) Small commensal crabs with very small eyes and orbits; carapace often more or less membranous (Pinnotheridae) . . . . . (28)
Free-living crabs with well developed eyes and firm, hard carapace. . . . . (34)

28. (27) Dactyls of walking legs simple, acute. . . . . (29)
Dactyls of 1st 3 walking legs bifurcate (Fig. XII). . . . . .Dissodactylus mellitae

29. (28) Third walking leg little, if any, longer than the other legs. . . . . (30)
Third walking leg larger and stronger than others, often considerably so. . . . . (31)

30. (29) Carapace of hard stage with a striking pattern of light spots on dark background. Carapace of post-hard stage covered with a short deciduous pubescence. . . . . Pinnotheres maculatus
No striking color pattern and carapace nearly naked . . . . . .P. ostreum

31. (29) Carapace less than twice as wide as long . . . . . (32)
Carapace more than twice as wide as long . . . . . (33)

32. (31) Propodus of 3rd leg as wide as long or nearly so. . . . . .Pinnixa cylindrica
Propodus of 3rd leg distinctly longer than wide . . . . . .Pinnixa retinens

33. (31) Single bilobed cardiac ridge present . . . . . . P. sayana
Cardiac region with 2 short ridges . . . . . .P. chaetoptera

34. (27) Carapace broad, short, rounded anteriorly. . . . . (35)
Carapace more or less quadrilateral; frontal region curved downward. . . . . (44)

35. (34) Distal articles of last pair of legs broad and thin, paddle-like (Fig. XIII) Portunidae. . . . . (36)
Distal articles of last pair of legs not paddle-like. . . . . (39)

36. (35) Carapace not very broad. . . . .Ovalipes ocellatus ocellatus
Carapace very broad. . . . . (37)

37. (36) Carapace profusely spotted with white dots ringed with brown. . . . Arenaeus cribrarius
Carapace dark colored, not profusely spotted . . . . . (38)

38. (37) Interorbital spines 4; abdomen of male ⅃ shaped, last two segments much narrower than basal segments . . . . Callinectes sapidus
Interorbital spines 8; abdomen of male triangular . . . . . Portunus gibbesii

39. (35) Antennules folding longitudinally (Fig. XIV, a); outer maxillipeds long, overlapping epistome. Cancridae . . . . . .Cancer irroratus
Antennules folding transversely or obliquely transversely (Fig. XIV, b); outer maxillipeds usually not overlapping the epistome. Xanthidae. . . . . (40)

40. (39) Dactyl of major chela with large basal tooth (Fig. XV) . . . . . (41)
Dactyl of major chela without large basal tooth . . . . . (42)

41. (40) Carapace with transverse rows of granulations; carpus without distal groove; third maxilliped with red spot on inner surface . . . . . .Panopeus herbsti
Carapace smooth, without transverse rows of granulations; carpus with distal groove; red spot lacking . . Hexapanopeus angustifrons

42. (40) Frontal margin of carapace transversely grooved, appearing double (Fig. XVII). *Rhithropanopeus harrisi*
Frontal margin of carapace not transversely grooved. . . . . (43)

43. (42) Carapace with transverse rows of granulations; tips of fingers of minor chela spooned (Fig. XVI). . . . *Eurypanopeus depressus*
Carapace smooth, lacking transverse rows of granulations; fingers of minor chela unspooned . . . . . *Neopanope texana sayi*

44. (34) Front broad; eyestalks of moderate length or short. Grapsidae (Fig. XIX). . . . . (45)
Front of moderate width or narrow; eyestalks often very long. Ocypodidae. . . . . (46)

45. (44) Lateral margin of carapace with a tooth behind the outer orbital tooth; body strongly convex above; inhabits salt marshes . . . . . *Sesarma reticulatum*
Lateral margin of carapace without a tooth behind the outer orbital tooth; body nearly flat above; inhabits beaches near the drift line . . . . . *S. cinereum*

46. (44) Eyestalks stout; chelipeds of male nearly equal. . . . . *Ocypode quadratus*
Eyestalks slender; chelipeds of male very unequal. . . . . (47)

47. (46) An oblique tuberculate ridge on inner surface of larger palm of male extending upward from lower margin (Fig. XVIII) . . . . . (48)
No oblique tuberculate ridge on inner surface of palm . . . . . *Uca pugilator*

48. (47) Front wide, at least 1/3 of fronto-orbital width; leg joints red; found along brackish streams. . . . . *U. minax*
Front narrower, less than 1/3 of fronto-orbital width; carapace in life greenish black; lives in muddy areas, often with *U. minax*. . . . . *U. pugnax*

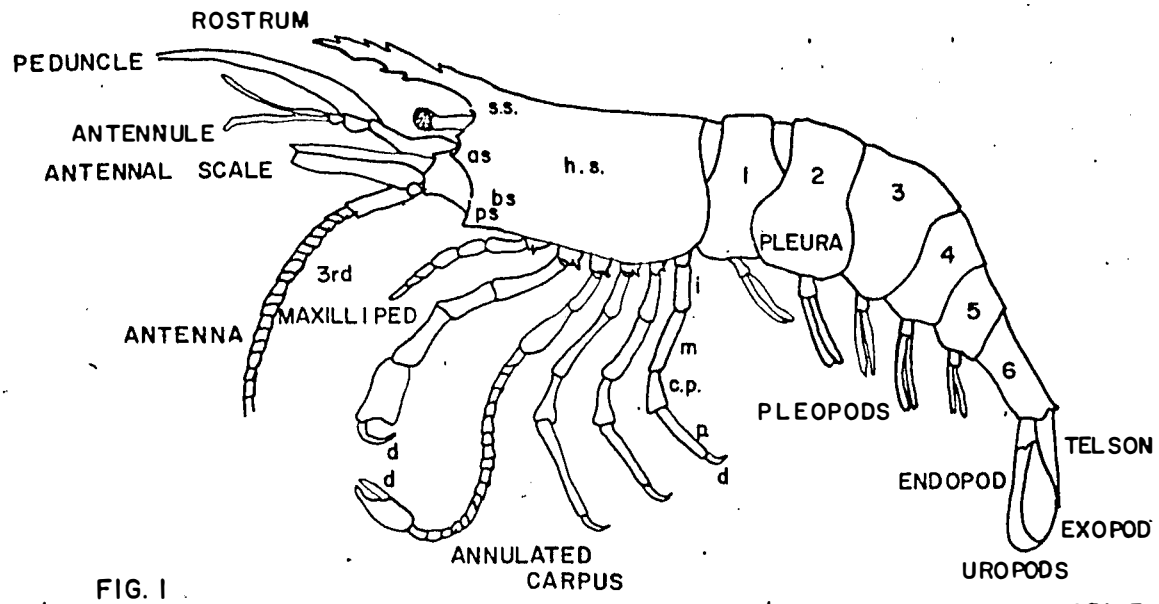


FIG. I
SCHEMATIC SHRIMP. a.s.– ANTENNAL SPINE, b.s.– BRANCHIOSTEGAL SPINE, p.s.– PTERYGOSTOMIAN SPINE, S.S.– SUPRAORBITAL SPINE, h.s.– HEPATIC SPINE, i – ISCHIUM, m– MERIS, c.p.– CARPUS, p.– PROPODUS, d– DACTYL.

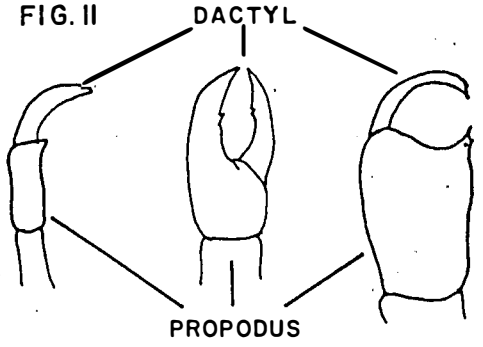


FIG. II
SIMPLE CHELATE SUBCHELATE

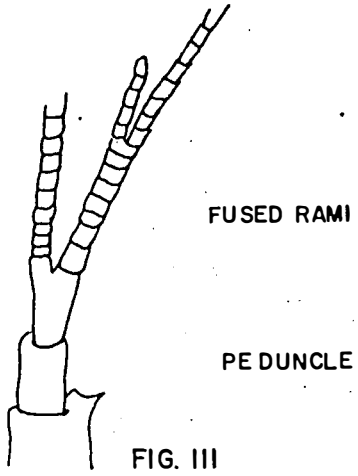


FIG. III

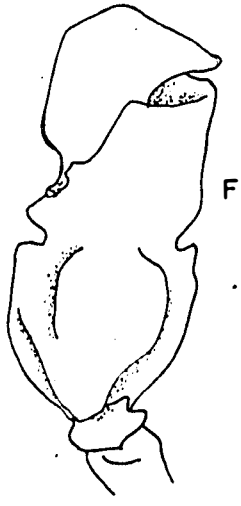


FIG.IV

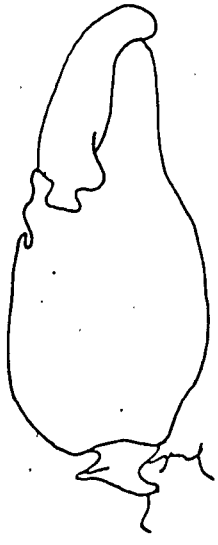


FIG. V

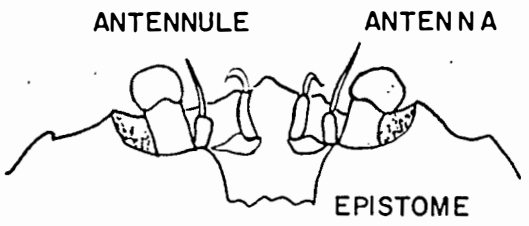


FIG. VI

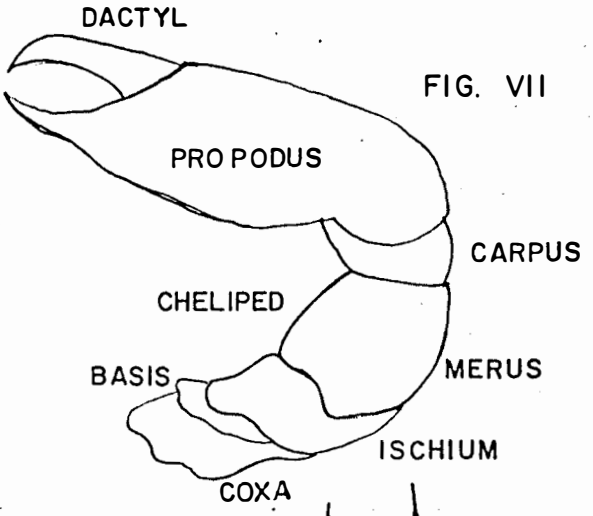


FIG. VII

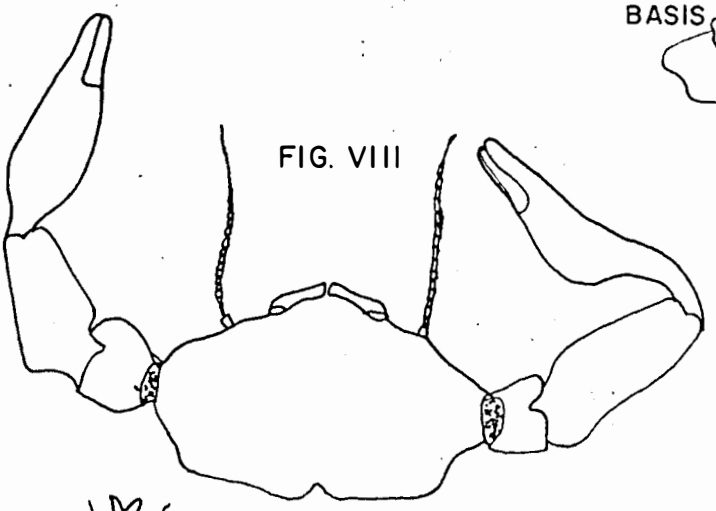


FIG. VIII

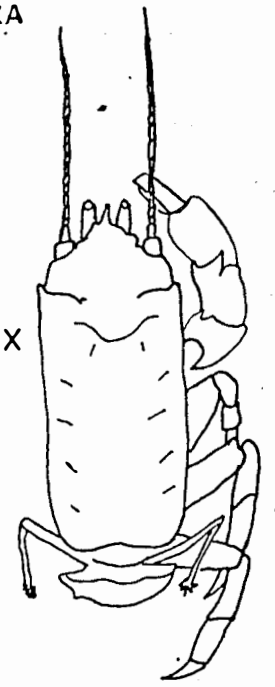


FIG. IX

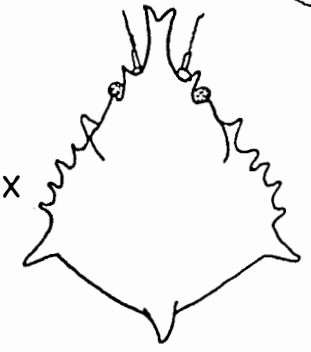


FIG. X

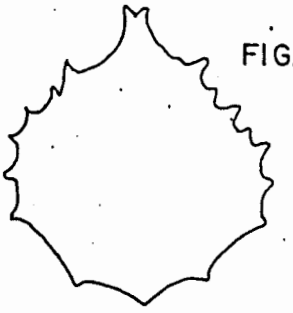


FIG. XI

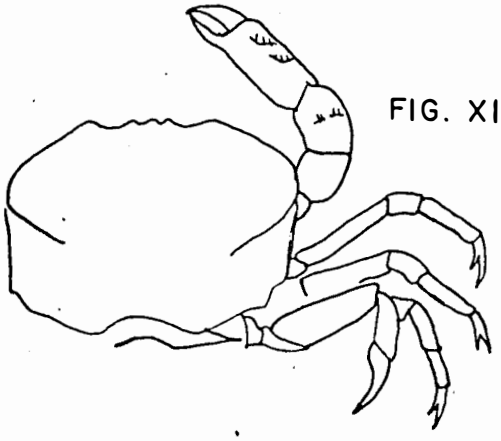


FIG. XII

FIG. XIII

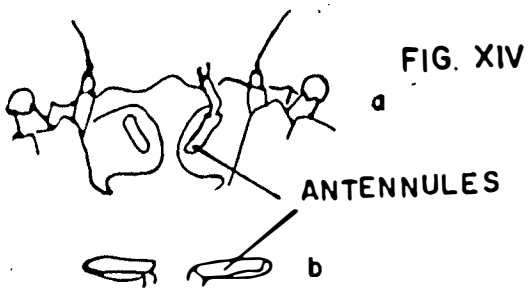


FIG. XIV

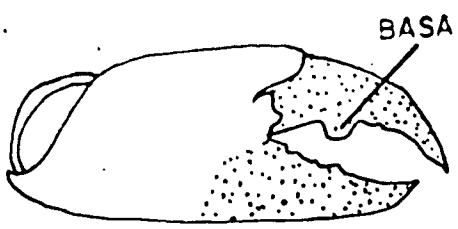


FIG. XV

FIG. XVII

FIG. XVI

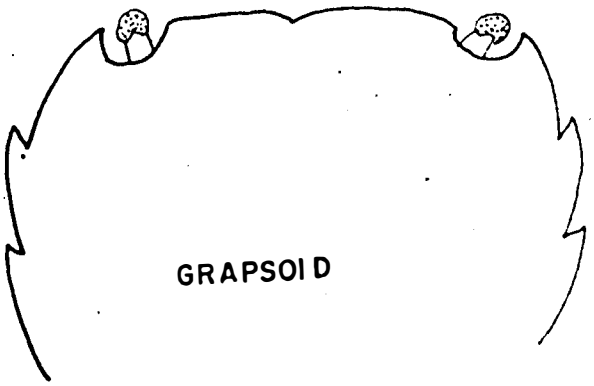
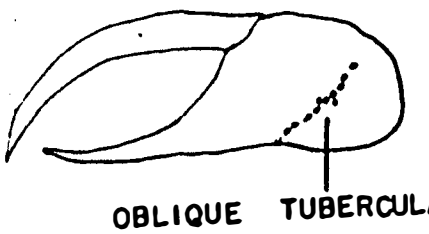


FIG. XIX

FIG. XVIII



Echinoderms

Key to Echinoderms of Chesapeake Bay

James Melvin

1.		Body disk stellate; arms present. . . . . (2)
		Body elongate, flat, or spherical; arms wanting . . . . . (7)
2. (1)		Arms continuous with disk; ambulacral groove present. Asteroidea. . . . . (3)
		Arms sharply separated from disk; ambulacral grooves wanting. Ophiuroidea . . . . . (4)
3. (2)		Marginal plates present, intramarginal plates elongated transversely to cover most of oral surface of arms; arms bordered with spines; aboral surface covered with rosettes of spinules. Rare . . . . . .*Luidia clathrata*
		Marginal plates and spines wanting; aboral surface warty in appearance . . . . .*Asterias forbesi*
4. (2)		Three, four or five oral papillae present on each jaw edge . . . . . (5)
		Oral papillae occurring as a cluster on jaw apex or numerous and arranged in a row along edge of each jaw. . . . . (6)
5. (4)		Three oral papillae present on each jaw edge . . . . . .*Amphiodia atra*
		Four or more oral papillae present on each jaw edge . . . . . .*Amphioplus abditus*
6. (4)		Bursa characterized by two slits; arm-spines held close to sides of the arms; radial plates wanting . . *Ophioderma brevispina*
		Bursa lacking slits; arm-spines held erect from the sides of the arms; 5 pair of radial plates aboral . . . . . *Ophiothrix angulata*
7. (1)		Body elongate; podia present or wanting. Holothuroidea. . . . . (8)
		Body oval or discoid; body covered with spines, large or inconspicuous. Echinoidea . . . . . (10)
8. (7)		Podia present . . . . . (9)
		Podia wanting; tentacles pinnate; anchor plates conspicuous. . . . . *Leptosynapta tenuis*

9. (8) Podia mostly present in ambulacral regions, in 5 bands. . . . . Cucumaria pulcherrima
Podia distributed without reference to ambulacral regions. . . . . Thyone briareus

10. (7) Body low-globular covered with cylindrical spines . . . . . .Arbacia punctulata
Body discoid; test covered with fine spines, pierced by five holes. . . . . .Mellita quinquiesperforata

Reference: (Other than the Woods Hole Keys and Miner's Field Book of Seashore Life, the following may be useful.)

Thomas, L. P. 1964. Amphiodia atra (Stimpson) and Ophionema intricata Lutken, additions to the shallow water amphiurid brittlestar fauna of Florida (Echinodermata: Ophiuroidea). Bull. Mar. Sci. Gulf and Carib. 14:158-167.

Deichmann, Elisabeth. 1954. The holothurians of the Gulf of Mexico. U. S. Fish and Wildlife Service, Fish. Bull. 55: 381-410.

Chaetognats

Key to the Chaetognatha of the Inner Continental Shelf Waters off Virginia

by George C. Grant

1. Only one pair of lateral fins . . . . . (2)
   Two pairs of lateral fins . . . . . Genus *Sagitta* (3)

2. (1) Fin entirely on tail segment; voluminous collarette; rare . . . . . *Pterosagitta draco* Krohn
   Fin extending over posterior third of trunk; body moderately robust; eggs cuboidal when mature; rare . . . . . *Krohnitta pacifica* Aida

3. (1) Anterior lateral fins begin considerably posterior to ventral ganglion. . . . . (4)
   Anterior fins begin at or near ventral ganglion . . . . . (6)

4. (3) Very transparent, flaccid body; anterior fins rounded, rayless; common in warm months . . . . . *Sagitta enflata* Grassi
   More opaque, rigid body . . . . . (5)

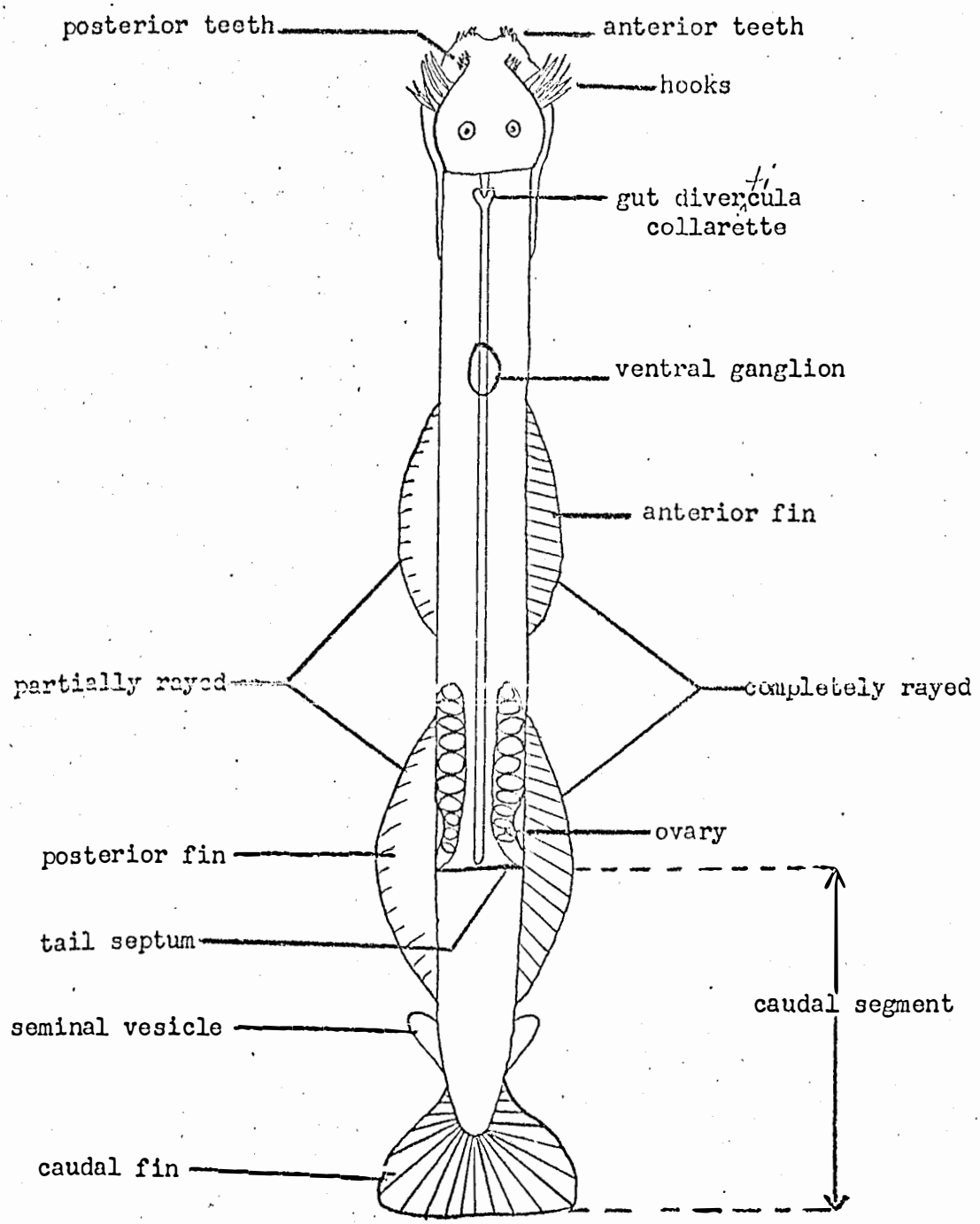
5. (4) Anterior fin very small, obscure; small species, maturing at 5-6 mm; occasional in late fall, winter . . . . . *S. minima* Grassi
   Anterior fin evident, entirely rayed; characteristic lateral view; large species with conical seminal vesicles; abundant, enters bay and rivers in winter . . . . . *S. elegans* Verrill

6. (3) Collarette very evident, extending at least half the distance from head to ventral ganglion . . . . . (7)
   Collarette absent, or if present not extending more than one-third the distance from head to ventral ganglion . . . . . (9)

7. (6) Anterior teeth numerous, over-lapping, fan shaped; body less opaque than *S. hispida*; common . . . . . *S. helenae* Ritter-Zahony
   Anterior teeth less numerous, narrower, not arranged in fan shape. . . . . (8)

8. Collarette extends in thin layer as far as seminal vesicles; rare. . . . *S. bipunctata* Quoy and Gaimard
   Collarette does not extend beyond ventral ganglion; opaque species; gut diverticulae usually obvious; apparently restricted to close-inshore waters . . . . . *S. hispida* Conant

9. (6) Inner margin of hooks serrated; fins partially rayed, presence of oil drops in gut valuable aid to identification; abundant . . . . . *S. serratodentata* Krohn
   Inner margin of hooks entire; fins entirely rayed; collarette small but evident; abundant inshore in warmer months; extends into bay in some months. . . . . *S. tenuis* Conant



Generalized diagram of a chaetognath, with the most important characters indicated.